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ABSTRACT

This monograph includes eight papers which were presented at a joint conference of the Conservation Education Association and The North American Association for Environmental Education in 1989 at Estes Park, Colorado and a summary paper. The first three papers are on preservice teacher education; five discuss inservice teacher education. Papers include the following: (1) "Rethinking Teacher Education Environmentally" (Paul Hart); (2) "Using Cooperative Learning Strategies to Develop Conflict Resolution Skills" (James D. Lubbers); (3) "Perspectives of Pre-service Education Students on Environmental Education Course Work" (Randy Champeau); (4) "Teacher Education in Environmental Education: The 'Grip of Print' and Other Lessons from Distance Education" (Ian Robottom); (5) "Cooperative Model for In-service Environmental Education in the State of Kansas" (Emmett L. Wright); (6) "Student Dropout Prevention: Teacher In-service Connections to Environmental Education" (Darleen K. Stoner); (7) "A Consortium Approach to Staff Development" (Peggy Cowan); (8) "Environmental Education: The In-service Experience" (Juan A. Sanchez Jr.); and (9) "Professional Development in Environmental Education" (Paul Hart and Ian Robottom). (CW)

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MONOGRAPHS

in

ENVIRONMENTAL EDUCATION

and

ENVIRONMENTAL STUDIES

Volume VI

PREPARING CLASSROOM TEACHERS TO BE ENVIRONMENTAL EDUCATORS

A report of a symposium, edited by

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THE NORTH AMERICAN ASSOCIATION
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The North American Association for Environmental Education

The North American Association for Environmental Education (NAEE) is a professional association established in 1971 to assist and support the work of individuals and groups in environmental education--teaching, research, and service. In meeting the goals of its target audiences, NAEE promotes the analysis and understanding of environmental issues and questions as the basis for effective education, problem-solving, policy-making, and management. It does not take formal positions on political or technical matters, except those relating directly to education.

Through its activities, the Association seeks to foster the education of skilled individuals able to understand environmental problems and possessing the expertise to devise effective solutions to them, along with the development of a citizenry conscious of the scope and complexity of current and emerging environmental problems and supportive of solutions and policies which are ecologically sound.

NAEE's geographic scope is international. The bulk of its membership is from the United States, but there is growing Canadian and Mexican membership, and additional membership from all continents (except Antarctica). Current total membership exceeds 1000, mostly individuals. Membership categories include regular, student, retired, life, affiliate, and institutional.

NAEE is organized in three interactive sections, each conducting specialized activities responsive to its members. The sections also cooperate with one another in activities of mutual interest and concern. The sections are: Elementary and Secondary Education (ESES), Environmental Studies (ESS), and Nonformal (NFS). Professionals within these sections address the following audiences: the general citizenry, fellow educators at all levels, K-12 students, those who make or facilitate the making of major decisions affecting the environment (e.g., government officials, scientists, engineers, planners, lawyers, journalists, mass communicators), and environmental resource managers (e.g., foresters, water resource managers, park managers).

NAEE is involved in two primary program thrusts: the annual conference and publications activities. The conferences have been recognized since the early 1970s for their quality and applicability to the interests of

the field. They provide a rich mix of invited speakers, formal and less-formal paper presentations, workshops, symposia, field excursions, film and video festivals, resources fair, exhibits, and more. NAEE publishes an annual conference Proceedings volume containing expanded abstracts of presented papers, and is engaged in the occasional publication of Monographs, such as this one, dealing with topics of particular and timely interest. A compendium of Recent Graduate Studies in Environmental Education and Communications, containing abstracts of master's theses and doctoral dissertations in environmental education and related fields, is published every other year. A bimonthly newsletter, The Environmental Communicator, features Association-related and more general information. A list of available publications is included in the back of this volume.

Major emphasis is currently being devoted to increasing the quality and quantity of services to members and for the general benefit of the field.

For more information about the North American Association for Environmental Education, contact:

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INTRODUCTION

Preparing Classroom Teachers to Be Environmental Educators, the symposium reported in this volume, was planned and developed in response to recommendations from an earlier symposium[1] which suggested exploration of teacher education in and for environmental education. Both symposia were presented at annual conferences of the North American Association for Environmental Education (NAEE)--the first in November 1987 in Quebec City, the second in August 1989 in Estes Park, Colorado, as a program component of a joint conference with the Conservation Education Association.

Of the eight papers presented at the 1989 symposium, three focussed on pre-service approaches and the remainder on in-service approaches to teacher education for environmental education. Collectively, these papers present a variety of viewpoints, as well as a multiplicity of "connections" to other educational concerns. One commonality among them is that they typically envision environmental education as necessarily calling for a balance of traditional and non-traditional approaches to teacher education. Another is that environmental education typically is associated, often loosely and occasionally with reservation, with science education. Perhaps the major point of diversity among the papers is the range of perspectives represented, ranging from theoretical/ philosophical considerations, through educational research exercises, to highly practical, on-the-ground, "how to do it" (or "this is how I/we do it") models.

In many ways, environmental education needs to mirror standard educational practice in teacher education, and to recognize its necessary and appropriate involvements in the total formal education enterprise. In other ways, environmental education is "different," in that its subject matter is by all the symposium authors seen as necessarily interdisciplinary, and its methodologies not necessarily those of the more established curricular entities. The symposium papers, taken together, address these spectra of concerns.

Below are author-developed abstracts of the symposium papers, as published in the conference proceedings volume[2].

Pre-service Teacher Education

Rethinking Teacher Education Environmentally, by Paul Hart: "Assume that conceptual development, coupled with environmental action skills, will lead to more effective environment-oriented behavior. If so, a logical conclusion is that teachers need those elements, plus teacher education basics. But environmental education curriculum development appears to have followed models not proved successful in changing school practice. We need to rethink some of the change processes that appear to impede, rather than promote, the conditions envisaged by much of the environmental education literature. This paper discusses those processes that must be altered if we wish to alter the education system."

Using Cooperative Learning Strategies to Develop Conflict Resolution Skills, by James D. Lubbers: "Most environmental problems and issues arise as a result of a conflict of interests, usually between the ideals of environmental preservation and the realities of economic development. To resolve many of these issues, people need to know how to get along with each other in cases where values and attitudes are in conflict. One possible step in the right direction is to incorporate the use of cooperative learning in classroom simulations of controversial topics. Specific skills such as sharing views, being critical of ideas and not people, role reversal, etc., can be learned directly by students, and with practice will become part of a much more 'cooperative' attitude in dealing with the resolution of issues."

Perspectives of Pre-service Education Students on Environmental Education Course Work, by Randy Champeau: "This paper reviews the results of a survey questioning the perspectives of pre-service teachers on their experience with mandated environmental education course work. The survey was administered to 105 junior and senior elementary and secondary education majors who had recently completed environmental education course work at the University of Wisconsin-Stevens Point. Results indicate that students perceive a need for mandating pre-service training in environmental education. They perceive their environmental education course work as being instrumental in motivating them to include environmental concerns in their teaching. They believe that environmental science content should be taught simultaneously with appropriate K-12 methods in pre-service

training. Further, they believe that environmental education should be a priority in the elementary and secondary school system, and would best be accomplished by infusion."

In-service Teacher Education

Teacher Education in Environmental Education: The 'Grip of Print' and Other Lessons from Distance Education, by Ian Robottom: "This paper outlines an in-service course for teachers of environmental education at a distance from the host institution, stating the course's assumptions about the nature of environmental education, about the relationship of schooling and environmental education, and about professional development. It also discusses some of the practical issues: appropriate support materials; other required forms of support such as telephone tutorials, regional tutorials, self-help groups; the advantages and disadvantages of committing the course to print for distribution to distant students; and the costs of materials production and support services."

Cooperative Model for In-service Environmental Education in the State of Kansas, by Emmett L. Wright: "Teachers, pre-service college students, and educators from non-formal settings attend an annual environmental education in-service workshop that explores the total school curriculum. The two-day workshop is scheduled immediately prior to the meeting of the Kansas Association of Teachers of Science (KATS). Strategies for conceiving, organizing, publicizing, presenting, and evaluating the workshop are reported. Suggestions for other states are discussed."

Student Dropout Prevention: Teacher In-service Connections to Environmental Education, by Darleen K. Stoner: "In-service programs for teachers of grades 4-12 focus on aspects of education which serve the needs of potential dropouts: personally relevant content, variety of learning styles, cooperative learning, and interdisciplinary themes. Four well-known programs are used. Classroom implementation techniques include linking environmental concepts to drug abuse and personal planning; utilizing environmental topics via interdisciplinary activities for middle schools; and applying environmental awareness and involvement activities to build self-esteem in high school students."

A Consortium Approach to Staff Development, by Peggy Cowan: "A consortium model for staff development includes district membership fees and a requirement for in-district plans for implementation of instructional or curriculum change. The model also empowers teachers as decision-makers in the process, not just recipients of the training. Meshing environmental education with other educational reforms that the district is committed to, such as cooperative learning, clinical teaching, whole language, or process science enhances the likelihood of long-term change."

Environmental Education: The In-service Experience, by Juan A. Sanchez Jr.: "Teachers will teach only what they are comfortable with. It is therefore not surprising that most teachers do not utilize environmental education techniques and strategies with their classes, nor do they take the time to address environmental problems and issues. The realistic constraints of a classroom situation and information from recent research papers and teacher observations, and a series of in-service workshop steps that have proved to be effective with teachers in Connecticut, are addressed in this paper."

Summary Paper

The final paper in this volume, Professional Development in Environmental Education by Paul Hart and Ian Robottom, was not presented at the conference. Rather, its authors took advantage of their participation in the symposium, the availability of the final copies of all the presented papers, some time for reflection, and proximity to one another at the University of Regina (where Paul is a member of the regular faculty, and Ian was a visiting faculty member) to collaborate on a summary of the conference presentations. Their paper draws upon all of the symposium papers in making a reasoned statement of the state of the art in teacher education in and for environmental education.

Acknowledgements

The Estes Park symposium was planned by Randy Champeau, John Disinger, David Engleson, and Paul Hart; David Engleson was coordinator. In selecting presenters, the planners attempted to achieve a balance between "pre-service" and "in-service" emphases, as well as between "theoretical" and "practical" approaches.

Richard Wilke and Michael Gross, respectively General Chair and Program Chair of the 1989 conference, were strongly supportive of efforts to organize and conduct the symposium. Lori Mann, Chair of the Publications Committee of the North American Association for Environmental Education, was both helpful and purposeful in smoothing the way toward publication of this Monograph, as were Joan Heidelberg, NAEE Executive Vice President, and her Troy-based staff.

Preparation of camera-ready copy was completed in the offices of the School of Natural Resources of The Ohio State University. Mignonne Whitlow, Administrative Secretary, was instrumental in these efforts.

David C. Engleson
John F. Disinger

December 1989

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1. John F. Disinger (ed). 1987. Trends and Issues in Environmental Education: EE in School Curricula. Columbus, OH: ERIC Clearinghouse for Science, Mathematics and Environmental Education.

2. Michael P. Gross, Richard J. Wilke, and Joseph F. Passineau (eds). 1989. Working Together to Educate about the Environment: Selected Papers from the Joint Conference of the North American Association for Environmental Education and the Conservation Education Association. Troy, OH: NAEE.

RETHINKING TEACHER EDUCATION ENVIRONMENTALLY

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**Man is a prisoner of his own way of thinking and of his own stereotypes of himself.
His machine for thinking
the brain
has been programmed to deal with a vanished world.**

(Beer, 1975, p. 15)

Introduction

The question asked of presenters at the 1989 North American Association for Environmental Education conference symposium on teacher education was, essentially, how might we educate teachers to be environmental educators. The purpose of this paper is to respond to this question from a theoretical perspective because of the need in environmental education to expose and debate the underlying assumptions and rationale that govern practice. In order to focus discussion within this very broad topic of teacher education, this paper attempts to begin the development of an argument for change in teacher education by problematizing some current widespread practices, by examining their consistency with environmental education philosophy, and by establishing a rationale for a critical pedagogy of teacher education in environmental education.

The Problem of Pedagogy in Environmental Education

The world of teacher education is a human world of decision, choice, and action. Professional teacher education is part of an academic environment that has evolved and politicized certain standard practices, for example, in research and curriculum development. These practices, in effect, operate as control mechanisms in that they provide the criteria for acceptability. For example, curricula in North America tend to be developed "at a distance from" teachers as prescriptions which seem necessary to carry out the business of organized schooling. Thus, it seems quite natural within teacher education to follow the common human tendency to adopt

certain rules, norms, and conventions both in the practice sense of programs and in the theoretical sense of ideas or ways of thinking about how things should work. These ideas and practices reflect underlying assumptions consistent with predominant worldviews or ideologies.

Even within a relatively new field such as environmental education, certain conventions have already evolved with respect to our thinking about education. Certain goals, for example, are generally accepted as appropriate. In the past these goals have been seen to be different from goals of mainstream education, but are justified by environmental educators based on what has amounted to original critical reflection of traditional goals of education. A major discrepancy arises, however, when conventional means are employed to develop and assess the adequacy of nontraditional goals designed to be achieved by nontraditional practice. The underlying assumption behind these discrepant events appears to have been that in order to gain status within an academic community of predominantly scientific researchers, environmental education must be able to justify itself in terms of conventional validity and reliability measures and to conform to traditional curriculum development, implementation and evaluation practices. The problem, in short, is that environmental education has reconceptualized educational goals at the level of practice, but has failed to reconceptualize the pedagogical practices that are also part of this curricular philosophy. Thus, we continue such contradictory practices as to mandate environmental education curricula and to research their effectiveness by employing empirical methods almost exclusively. How else could you do it!

To understand inconsistencies in the pedagogical theory and practice of environmental education, one must acknowledge its relationship to science education. Historically, environmental education has direct linkages to science education, primarily through practitioners in teacher education. Given these connections, there has been a natural tendency to ground the unconventional, the undisciplined upstart of environmental education within the canons of "legitimate" science education curriculum development and research. However, students of curriculum change will recall the problems associated with top-down models of curriculum development and implementation that surrounded the science curriculum projects of the 1960s (the failure of assumptions about theory being put into practice directly and easily using standard RDDA [research-development-diffusion-adoption] models of curriculum development) and the tendency to

rely almost exclusively on scientific/agricultural models of research as a means of theoretical enlightenment. It is ironic that environmental educators attempted to emulate a field such as science education--a field now in a serious state of crisis because of the failure of these very conventions of research and development.

The Problem of Research (Theory) in Environmental Education

A standard assumption within professional education is that research (theory) can improve teaching and teacher education, and that the process is relatively simple and predictable. In academic communities, research can act as another means of control. For example, within university faculties of education there are both external pressures to conform to grant selection criteria and internal pressures to meet criteria for publication in "respectable" education periodicals such as The American Educational Research Journal (AERJ), not to mention the press of the arts, sciences, and humanities on professional schools such as education. Research has status in faculties of education and universities if it conforms to accepted standards and practices. Faculty tenure and promotions remain directly linked to publication records.

In educational research, the predominant methodology is what Popkewitz, Tabachnick, and Zeichner (1979) term the empirical-analytical paradigm. This framework for the study and practice of teacher education can be described in terms of a technological metaphor associated with the search for effective behaviors which can be delivered to teachers through skills training. This viewpoint is associated with researchers who define teaching in behavioral terms and who rely on research for prescriptions about effective practice.

Within environmental education, there has been a constant pressure to improve the status of The Journal of Environmental Education by editorial policies, written or unwritten, that reflect a conception of educational research that falls squarely within the analytic, quantitative paradigm--a paradigm that is philosophically inconsistent with environmental education's principles and practices. By adopting this perspective, leaders in the field of environmental education have assumed that standard quantitative research methods can answer practical pedagogical questions--an assumption that must be questioned, given our experience in the field of science education. Perhaps our methods as much as our

goals must be regarded as problematic within environmental education.

The Need for an Environmental Perspective

There are dangers in over-reliance on conventions and generalizations in a human endeavor such as education; they dull the senses. Uncritical acceptance of standard curriculum development models and research methods results from a failure to seriously reflect on the assumptions that underlie the relationships between education theory and practice. Educational theories, because of their subjective nature simply cannot be expected to demonstrate levels of validity and reliability even when applying scientific methods designed to give rigor to objective scientific theories. How long will educators fail to recognize that application of inappropriate methods will not yield answers to even the most thoughtful questions? This issue of methodological appropriateness is useful to teacher education. It forms part of the debate as science educators attempt to resolve the crisis in science education. It should be a topic of active debate among environmental educators who seek to avoid pitfalls that have plagued traditional education disciplines such as science education.

Environmental education has emerged as a distinctive educational endeavor with broad interdisciplinary goals that promise to transform education--goals related to integration of school subject matter, systems thinking, problem solving, and decision making. Its methods foster, at the same time, a cooperative spirit through global thinking and an independent spirit in learning how to learn. Some of the essence of what it means to be environmentally literate has been captured by Hungerford and his students (Hungerford, et al., 1980) and more recently, by McClaren (1989). It is obvious that environmental educators have long been asking critical questions of the form and content of education in the schools; this is the nature of the social reconstructivist world view of environmentalism. It is somewhat disconcerting, therefore, to acknowledge that environmental education research and development, particularly in teacher education, contradict the nature and spirit of the reconstructionist world view. To attempt to justify an environmental worldview based on a social reconstructionist paradigm by relying almost exclusively on the research and development techniques of an academic rationalist (technicist) paradigm based

on a theory of reproduction is inconsistent theoretically and inappropriate methodologically.

Donald Schon (1983), in The Reflective Practitioner, argues that our universities assume a model of technical rationality where understanding is objectively based and where research is empirically based. Those who generate knowledge about curriculum and instruction, for example, and those who do the research, using increasingly sophisticated analytical procedures are the specialists, not those who experience the problems of practice. Yet those who do experience problems of practice are expected to apply and implement the results of research to improve their practice. This chasm between research and development (theory) and teaching (practice) is one of the major contributing reasons for the crisis of confidence in the professions.

Teachers and teacher education have received the brunt of recent public criticism of the professions. Teacher education programs have been declared inadequate, ineffective, and in some cases totally irrelevant--a dismal picture predicting an even more dismal future. Yet, amid this crisis in confidence in teacher education, a growing body of educators and the public are rediscovering the value of pedagogy in teacher education. Whereas, in the past, teachers have been characterized within educational theory as defective by those who "know" it and use it to recognize defects in teaching behavior or as effective by those who "know" research and use it to demonstrate effective practices and prescribe remedies, an alternative approach to teacher education is emerging. Defective and effective images of the teacher are being replaced by the reflective image (Russell, 1987).

Schon (1983,1987) outlines an epistemology of knowledge-in-action that attempts to focus on the theory-practice interface. This theory may be applied to teacher education. A central element in the theory, a process called reflection-in-action, effects an integration of research, curriculum, and practice. In contrast to the technical metaphor of the empirical-analytical paradigm, this reflection-in-action process can be described using an ecological metaphor associated with the search for reciprocal relationships between theory, as defined by curriculum and research, and teaching practice. It would seem appropriate to introduce the idea of reciprocal relationships, a fundamental ecological concept that emphasizes the shaping influence people and their environment have on each other, given our more sophisticated understanding

of the give-and-take change process that occurs in the professional development of teachers.

People who endorse this "ecological"worldview seek to empower teachers through a reciprocal process of critical reflection (thinking) and action (doing). There is a growing sentiment that what teachers do is affected by what they think. A growing number of researchers are exploring the mental life of teachers, what McCutcheon (1985) refers to as teachers' personal theories of action. This new approach to action research represents a major departure from conventional theory as it relates to teaching teachers and from some major trends in traditional research methods that have been employed to study teaching.

It is important to draw a distinction between end and use of this research as a means of clarifying its purpose. From a behaviorist perspective, research on how teachers think about what they do could be reduced to the products of cognitive findings to be put into teachers' heads. This perspective would align with conventional expectations of the deficit or "training" paradigm that teachers need to be taught what to think as well as what to do. Alternatively, the scientific study of teaching, from a reflection-in-action perspective, could be used to induce teachers into habits of research for the sake of their own development and our collective understanding of pedagogy. Not only does this new perspective on teacher education appear to be more logically consistent with principles of adult learning and staff (professional) development of teachers, but, I will argue, this new epistemology is congruent with the environmental or reconstructionist, some would say constructivist worldview (see Driver and Erickson, 1983; Erickson, 1987).

All curricular decisions, including those within teacher education, are based on implicit or explicit philosophical assumptions. Often these assumptions comprise a particular ideology or worldview, a belief superstructure. Empirically derived knowledge may permit predictions but the ultimate choice of action involves human values. Thus, in teacher education, it is not a frivolous or esoteric pursuit to attempt to make explicit underlying assumptions, biases, and preferences that govern the structure, pattern, and organization of curricular alternatives. For example, the scientific worldview is committed to an empirical epistemology. Science education, rooted in science, is governed partly by this worldview but must attend to alternative philosophies of education. What appears to be happening

to science education in the 1980s is an attempt to broaden its philosophical base to include, more centrally, an epistemology of constructed knowledge. The implication for curriculum is a shift in emphasis from a combination of knowledge acquisition and process development to the application of processes to science and technology-related societal and environmental problems, hence the STSE (science, technology, society, environment) movement. Environmental educators can appreciate the logic involved in this evolution of thinking in science education despite the disciplinary chauvinism that has characterized it (Lucas, 1980).

The environmental worldview that drives environmental education has always challenged existing disciplines to adopt more problem-centered curricula (based on a reconstructionist epistemology of pragmatism). Within this worldview, knowledge may be constructed using various methods including scientific analysis, reflective thinking, or critical thinking for decision-making purposes. The validity of knowledge constructed in this manner can be verified but because it is also founded in experience, is regarded as tentative and subject to revision or rejection as a consequence of subsequent experience.

Teacher education based on an epistemology of constructed knowledge tends to regard its curriculum development activities and research methods in terms of processes of learning that are required to construct knowledge but this is filtered through the world of experience. The focus shifts from "knowing that" to "knowing how" to learning how to construct and solve personal problems of practice based on articulated personal theories of action. Clearly, the emerging new perspective in teacher education based on reflection-in-action is more logically consistent with the environmental than the scientific worldview.

In science education, the debate over education in science versus education about science illustrates a clash of worldview that is represented, more generally, in teacher education. Simply put, if one believes that all citizens require well developed skills and knowledge in mathematics, science, and technology--that is, a high degree of scientific, technological, and environmental literacy, then teaching pure science exclusive of societal or human value questions necessitates a conceptual style mismatched to STSE and, by extension, to environmental education philosophy. The argument holds at classroom levels but also at levels of curriculum development, research methods, and professional

development within teacher education. An environmental worldview is pervasive in that consistency of practice is required in classrooms but also in research and development.

Teacher Education Perspective for Environmental Educators

Reflection-in-action, as a concept for reconstructing teacher education, may be best conceived as a pervasive epistemology (after Schon, 1985) founded on elements of critical theory and reflective teaching but ultimately grounded in a worldview of pragmatic reconstructionism. This worldview is more closely aligned with the environmental than with the scientific worldview. Thus, it would seem appropriate to propose that elements of both the curriculum development and research process within teacher education, be reevaluated and reformulated to be consistent with this alternative to the predominant scientific worldview that has governed research and development activities in the field of education. Given the close relationship between reflection- in-action epistemology and that which governs environmental education, it would appear useful, in the development of teachers as environmental educators to indicate the logical consistency of both epistemologies with the environmental/ecological worldview.

A reflection-in-action perspective of teacher education conceives teachers as professional decision-makers whose judgments are based on informed inquiry and critical reflection. The following features illustrate how this perspective may transform certain elements of teacher education for environmental educators to reflect a more operationally consistent worldview in areas of pedagogy such as curriculum and research:

A reflection-in-action perspective on teacher education places emphasis on educational aims and consequences as well as the technical skills of teaching. Teachers are encouraged to consider ethical and value-based issues and this facilitates environmental education goals. Teachers are also encouraged to contribute to the formulation of policy at classroom, local, and national levels thus acknowledging the political nature of human interpretations of the ecological process of change. Teacher education should carefully prepare teachers for this role.

A reflection-in-action oriented teacher education program emphasizes combining certain skills and attitudes (attitude development has long been debated in environ-

mental education circles). That is, teacher education should focus on developing those skills involved in classroom enquiry by teachers--practical action research. In order to develop these skills, certain attitudes toward teaching are required, such as openmindedness (a willingness to reflect, to challenge one's own assumptions, prejudices, and ideologies as well as those of others); wholeheartedness (a genuine enthusiasm and commitment to the quality of the teaching/learning process); and responsibility (a social awareness that predisposes action). Diversity of action is closely tied to the ecological principle of diversity, an example is Ashley's law of requisite variety (Beer, 1975).

Teacher education programs based on a reflection-in-action paradigm emphasize a process model of education where teachers learn to monitor and evaluate their own practice reflexively, that is, an action research model, a cyclical process in which teacher action-reflection-improved action is seen as a dialectic between theory and practice, much like the principle of reciprocal relationships is viewed in ecology.

A reflection-in-action approach to teacher education would not propose to eliminate or replace educational disciplines but rather to use them to emphasize relationships to the teacher's own thinking about practice. That is, the traditional subjects, when combined with classroom experiences, would provide a basis on which to develop teachers' personal theories of action. The associated ecological principle is that of optimization.

Within this new perspective for teacher education, the effective teacher is not one programmed with research (theory)-based answers to many discrete teaching situations. Rather, the reflective teacher is one who is able to conceive his/her own teaching in purposeful terms---one who is able to size up a particular teaching situation, choose an appropriate action, judge results in relation to context and original purposes. This concept operationalized is congruent with self regulation within ecological systems.

To "see" teachers as reflective practitioners, rather than "defective" or "effective," is to adopt a different worldview and underlying epistemology for teacher education. To "see" the potential of the reflective image of teaching requires a perspective that integrates objective and subjective research accounts of practice and embraces a dialectical view of the relationship between research (theory), curriculum, and practice --a view that problematizes, examines, and penetrates the

traditional ideology of teacher education with an ecological reference frame.

Despite our attempts to "scientize" education over the last 50 years, we have never made much progress in our attempts to scientifically develop a "theory" of teacher education that we can assume as a goal of teacher education research. We have not much evidence that all of our best research has directly resulted in improved practice. Perhaps a new image of teacher education--one that is based on a new image of educational research linked to a reflection-in-action epistemology--will provide the means to educate teachers environmentally. Given our record in teacher education, the effort must be made, now.

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USING COOPERATIVE LEARNING STRATEGIES TO DEVELOP CONFLICT RESOLUTION SKILLS

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Introduction

This year's conference theme, "Working Together to Educate About the Environment," is indicative of the extent to which the theme of "cooperation" seems to have pervaded our collective thinking. Environmental educators have been thinking this way for decades, and now that environmental concerns are making headlines and magazine covers, even world leaders are beginning to see the need for global cooperation.

Central to the idea of cooperation is the idea of interdependence. In turn, interdependence is perhaps the most significant descriptor for understanding Nature and for understanding the role and impacts of humans on this planet. The essence of both cooperation and interdependence is an attitude of working together to accomplish particular goals. For humans, that goal is a sustainable society, living in harmony with other life forms in a clean environment. With Nature, cooperation and interdependence among components in an ecosystem provide for stability and adaptability within that system. We need to appreciate the significance of "lessons" learned from Nature and strive to conduct ourselves in a manner consistent with natural laws. Cooperative learning in the world's classrooms can help by giving us a sense of interdependence, with each other as well as with the environment.

Cooperation among people seems to occur in times of stress or catastrophe, but in general does not receive the kind of attention needed to help us avoid stress or catastrophe. We are too competitive and too self-serving to be concerned about the common good. However, as "impending doom" in the form of various environmental catastrophes (not to mention political, social or economic catastrophes) begins to threaten the individual status quo, cooperation and its concomitant sense of interdependence may start to replace some of the self-defeating attitudes that got us into this mess. The time is right for a deliberate attempt at getting people to think cooperatively, particularly regarding environmental issues. We should be smart enough to begin

setting some limits on our use and abuse of the global ecosystem and realize our interdependence with this system, with other people, and with other life forms.

What is Cooperative Learning?

In the literature of formal education, the notion of cooperative learning (not cooperative education!) has been getting a great deal of attention in recent years. It is not a particularly new idea but the time seems to be right for realizing its potential. At the very least, it's not any less effective than any other approach to learning; at best, it may be just the stimulus or catalyst needed in educational reform efforts to give us that all-important sense of hope for the future.

Without going into all the mechanics of cooperative learning (CL), it is often described as a team approach to learning where each member of a group (usually of three or four individuals) is interdependent with the other members for accomplishing a specific task/assignment. Each member is accountable to the group for a particular part of the lesson and therefore to the overall success of the team. Likewise, the team's success is dependent on everyone learning all parts of the lesson, so it is up to the team to make sure that each member knows the material. This sense of interdependence and teamwork leads to increases in achievement for most students and has the added benefit of providing opportunities for the students to learn how to work together to solve common problems.

The CL approach is useful at all grade levels and in all subject areas. In addition, it is estimated that "collaborative learning" is being used at more than 450 colleges and seems to gaining in popularity (Watkins, 1989). The nature of the learners, the nature of the lesson, and other constraints should determine the best way to teach a lesson. It is important to note the CL should not be used exclusively at the expense of other more traditional methods, but rather should be added to the repertoire of techniques that all good teachers should have. As a method, CL deserves its place in methods courses in colleges and universities everywhere, so that all future teachers will be able to use it when appropriate.

The most important aspect of CL, for our purposes as environmental educators, is the opportunity individuals have for learning how to work together. The need for learning collaborative skills is reinforced by

the fact that there is a lesson to complete, especially if it is a lesson related to differences of opinion or controversial issues. They must develop the skills to work together in an effective manner if they are to succeed. As the students work in groups, the teacher has the opportunity to observe how well the groups exhibit specific skills and then take measures to reinforce and encourage the types of skills called for in any particular lesson. As the students gain more experience using these skills, they should become more proficient in working with other individuals, both in and out of the classroom. As adults, and especially when encountering people who are "different" for any reason, these skills will prove invaluable.

Developing Conflict Management Skills

Many factors enter into the decision of what skills should be taught and when. Obviously, the ages of the students and the lesson at hand will determine the skills needed for that specific learning episode. As importantly, the amount of time and experience a specific group has had working together will determine the level of the skills that can be expected. A group meeting for the first time cannot be expected to function at the same level as a comparable group meeting for the nth time. A group must have ample opportunity to learn the skills of working together and the teacher must help to nurture the development of those skills. The teacher also has to know the students and know when the group needs help or needs to be changed. There are many different skills that enable people to work together. By adulthood, most of us have learned most of what we need to get along with other people, but how much easier, more productive, and more interesting life might have been had those skills been taught more deliberately!

As stated earlier, CL is based on a sense of interdependence among group members. It is this "team" mentality that provides the incentive for individuals to develop the skills to work together toward a common goal or reward. As the group begins to work effectively, at least four categories of skills become evident. These are described by Johnson and Johnson (1984) as communication, trust building, leadership, and conflict management skills. Early on, basic communication skills such as equal opportunity to speak and active listening are fundamental to continuing success. As relationships evolve, elements of trust and acceptance will appear and should continue to grow as the group improves its ability to function effectively. Likewise, leadership skills

should develop with each individual, because each group member must make a contribution to the group goal as well as share the responsibility for group learning. The conflict management skills, while apparently more complex, may be a function of the other three categories. Even at a beginning stage, group members must realize that they need to operate within basic ground rules in order to work as a group. It is important to remember that specific levels of any of these skills must be identified as observable behaviors so that the teacher can help individuals to be productive and effective members of their groups.

From an environmental education perspective, the conflict management skills may be the most relevant, in the sense that students learn to understand and accept differences among members of the group. Specifically, at the early stage of group functioning, the group may simply agree to not interfere with each other's learning, and commit to staying in the group. As group members learn to work together, the skills may include sharing of feelings and acceptance of individual differences in thinking. With a great deal of time and experience, depending on age and other variables, perhaps they can agree to disagree, and learn to criticize ideas without criticizing the person. Johnson and Johnson (1988) further refine and delineate these skills in their "structured controversy" model for teaching about controversial issues. With this model, students must learn about differing viewpoints and learn to reach agreement within the group for making a decision regarding the issue. In other words, students are required to use the very skills they find represented in the lesson materials. Learning these types of skills is both called for and reinforced by the structure of controversial issues.

Summary

In the most basic sense, an attitude of cooperation and a sense of interdependence are essential for resolution of global environmental issues. Secondly, one of the main categories of skills that can be gained through working together in CL groups is that of conflict management--simply how to get along with each other to accomplish a specific task. And, perhaps most importantly, environmental issues provide a structure for examining various viewpoints and that requires individuals to resolve their differences through problem-solving or decision-making strategies.

Cooperative learning, while useful for any subject area or grade level, can be considered a particularly appropriate method for training teachers as environmental educators. It can be used in methods courses for the teachers to learn as a technique for them to use with their students, and it can also be used directly as a strategy for providing teachers with information and skills about environmental issues. Using CL both ways will serve to reinforce the many benefits that can be derived from working together and talking to one another. With the resolution of societal/environmental issues as the ultimate goal, and cooperative learning as the ultimate method, tomorrow's teachers will have a new sense of hope and purpose that they can pass on to their students.

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PERSPECTIVES OF PRE-SERVICE EDUCATION STUDENTS ON ENVIRONMENTAL EDUCATION COURSE WORK

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Introduction

Beginning in 1985, the Wisconsin Legislature mandated that all education candidates in agriculture, science, social science, early childhood, and elementary education must receive course work in environmental education which addresses the following objectives:

> **Administrative Code Requirement in Environmental Education PI 3.07(1)(d) is created to read:**

Environmental education. Effective July 1, 1985. Adequate preparation in conservation of natural resources is required for a license to teach early childhood, elementary education, agriculture and for secondary education licenses in science and social studies with the exception of philosophy, psychology, and religious studies. Programs shall provide students with the following knowledge:

1. **Knowledge of the wide variety of natural resources and methods of conserving these natural resources;**

2. **Knowledge of interaction between the living and non-living elements of the natural environment;**

3. **Knowledge of the concept of energy and its various transformations in physical and biological systems;**

4. **Knowledge of local, national, and global interactions among people and the natural and built environments, including;**

   a. **Historic and philosophical review of the interactions between people and the environment;**

   b. **the social, economic, and political implications of continued growth of the human population;**

c. the concept or renewable and non-renewable resources and the principles of resource management;

d. the impact of technology on the environment; and

e. the manner in which physical and mental well-being are affected by interaction among people and their environments;

5. Ability to use affective educational methods to examine attitudes and values inherent in environmental problems;

6. Ability to incorporate the study of environmental problems in whatever subjects or grade level programs the recipient or the certificate or license is permitted to teach through the use of the following methodologies:

   a. outdoor teaching strategies;
   b. simulation;
   c. case studies;
   d. community resource use, and
   e. environmental issue investigation, evaluation, and action planning;

7. Knowledge of ways in which citizens can actively participate in the resolution of environmental problems.

Wisconsin universities and colleges have taken many different approaches to meeting the mandate (Champeau, et al, 1987). In the case of UW-Stevens Point, the mandate is incorporated into a three-credit, semester-long environmental studies/education course that all related education majors are required to take. The course meets four hours a week. Students spend two hours in large-group lecture on environmental studies content, and two hours in small-group discussions (i.e., 20 per class) dealing with environmental education methods.

The course at UWSP has been offered since 1985. To evaluate the effectiveness of the course relative to the mandate, the instructors developed an assessment instrument with the following objectives:

1. Determine to what extent education majors would have elected to take a course like this if it were not mandated;

2. Determine the extent of support for the mandate after experiencing a course that addressed it;

3. Determine the extent to which the students are motivated to incorporate environmental education into their teaching as a result of the course;

4. Determine if selected approaches or methods were more desirable than others when providing pre-service instruction in environmental education;

5. Determine the extent to which respondents perceived the process of "infusion" as being an appropriate approach to incorporating environmental education into K-12 education; and

6. Determine the perceived relative importance of pre-service course work in environmental education to other education course work taken by the students.

Methods

Instrument Design. Each of the objectives supported the development of one or two statements in the assessment instrument. A Likert-type scale was used to quantify responses. Descriptive statistics in the form of percentages were obtained as results. The instrument was piloted (N=30) and submitted to a validity panel (University Education faculty) for review. Statements were revised based on the pilot and comments from the panel. The final version of the instrument contained 13 statements. (See Tables 1-13).

Population. Respondents consisted of 111 pre-service education students. All students were juniors or seniors in social studies education, science education, early childhood education, and elementary education fields.

Administration of Instrument. The instrument was administered during the last class period of the semester. Students were given as much time as they needed to fill it out. All instruments were administered by the same individual. To obtain the most honest responses, returns were kept anonymous.

Results

Objective 1. The extent to which education majors would have taken this course if it were not mandated is quantified in Table 1. Results indicate that 51% of the students would not have taken the course as an elective, 35% were unsure if they would have, and 13% suggested that they would have taken it as an elective. That the majority would not have taken the course as an elective become more convincing with results provided in Table 2, which indicates that 96% agree or strongly agree that their primary reason for taking the course was because it was required.

Table 1

Question 2. Prior to taking this course, I 'm sure I would have elected to take an environmental course such as this even if it were not required as a part of my program.

	SA	A	N	D	SD
N =	3	12	39	45	12
% =	2.7	10.8	35.1	40.5	10.8

Total N = 111
Mean Response = 3.45 (1=Strongly Agree, 5=Strongly Disagree)

Table 2

Question 1. The primary reason for taking this course is because it was required as a part of my program.

	SA	A	N	D	SD
N =	62	45	3	1	0
% =	55.8	40.5	2.7	.9	0

Total N = 111
Mean Response = 1.47 (1=Strongly Agree, 5=Strongly Disagree)

Objective 2. After experiencing the course, 95% of the respondents felt it appropriate to require education majors to be involved in environmental education course work such as they experienced. Only three of the 111 students disagreed with requiring the course work (Table 3).

Table 3

Question 3. Now that I have experienced the content of this course, I feel it is appropriate to require education majors to be involved in environmental education training.

	SA	A	N	D	SD
N =	77	29	2	2	1
% =	69.3	26.1	1.8	1.8	.9

Total N = 111
Mean Response = 1.4 (1=Strongly Agree, 5=Strongly Disagree)

Objective 3. The extent to which students are motivated to incorporate environmental education into their teaching is quantified in responses to assessment questions 4, 9, and 10 (i.e., Tables 4, 5, 6).

Results (Table 4) indicate that 97% feel they will infuse environmental education into their teaching as a result of related course work. Correspondingly, 96% strongly agree or agree that environmental education should be a priority in K-12 education (Table 5). This is confirmed by the 98% who responded negatively to the statement that it shouldn't be a priority (Table 6).

Table 4

Question 4. As a result of this course, I will probably infuse environmental education into my teaching.

	SA	A	N	D	SD
N =	70	38	2	1	0
% =	63.0	34.2	1.8	.9	0

Total N = 111
Mean Response = 1.4 (1=Strongly Agree, 5=Strongly Disagree)

Table 5

Question 10. Environmental education should be considered a priority in our K-12 educational system.

	SA	A	N	D	SD
N =	62	45	4	0	0
% =	55.8	40.5	3.6	0	0

Total N = 111
Mean Response = 1.4 (1=Strongly Agree, 5=Strongly Disagree)

Table 6

Question 9. Environmental education really shouldn't be a priority in our K-12 education system.

	SA	A	N	D	SD
N =	0	0	2	49	60
% =	0	0	1.8	44.1	54.0

Total N = 111
Mean Response = 4.52 (1=Strongly Agree, 5=Strongly Disagree)

Objective 4. Two approaches to environmental education in-service training were identified as preferable to the students. As indicated in Table 7, 84% of the respondents indicated they believe pre-service courses like the environmental education course should be taught by individuals with relevant K-12 teaching experience. This is confirmed by the responses recorded in Table 8, which indicate that 82% disagreed with the idea that relevant K-12 experience of the instructor doesn't matter.

Students also felt (i.e., 86%, Table 9) that it is important that environmental studies content be taught simultaneously with appropriate K-12 teaching methods. This response is confirmed by the 76% (Table 10) of respondents who disagree that it really doesn't matter if the two are taught simultaneously.

Table 7

Question 8. It is really important that the person teaching a university course like this has had relevant K-12 teaching experience.

	SA	A	N	D	SD
N =	47	47	14	3	0
% =	42.3	42.3	12.6	2.7	0

Total N = 111

Mean Response = 1.7 (1=Strongly Agree, 5=Strongly Disagree)

Table 8

Question 7. It really doesn't matter if the person teaching a university course like this has had relevant K-12 teaching experience.

	SA	A	N	D	SD
N =	0	7	12	53	39
% =	0	6.3	10.8	47.7	35.1

Total N = 111
Mean Response = 4.1 (1=Strongly Agree, 5=Strongly Disagree)

Table 9

Question 6. In teacher training, it is very important that the content of environmental studies be taught simultaneously with appropriate K-12 teaching methods.

	SA	A	N	D	SD
N =	47	49	12	2	1
% =	42.3	44.1	10.8	1.8	.9

Total N = 111
Mean Response = 1.7 (1=Strongly Agree, 5=Strongly Disagree)

Table 10

Question 5. In teacher training, it really doesn't matter if the content of environmental studies is taught simultaneously with appropriate K-12 teaching methods.

	SA	A	N	D	SD
N =	0	9	17	61	24
% =	0	8.1	15.3	54.9	21.6

Total N = 111
Mean Response = 3.90 (1=Strongly Agree, 5=Strongly Disagree)

Objective 5. The process of infusion is perceived by respondents to be more favorable (i.e., Table 11, 86% Agree to Strongly Agree) than having select teachers involved in environmental education. This is confirmed by responses in Table 12, which indicate that 80% disagree that environmental education would be best accomplished by select teachers in select subject areas.

Table 11

Question 11. The process of infusing environmental education by most teachers is more appropriate than having only select teachers or curriculum (e.g., science) responsible for its infusion.

	SA	A	N	D	SD
N =	35	61	9	6	0
% =	31.5	4.9	8.1	5.4	0

Total N = 111
Mean Response = 1.8 (1=Strongly Agree, 5=Strongly Disagree)

Table 12

Question 12. Environmental education would be best accomplished by having select teachers responsible for teaching it (e.g. science teachers) rather than having it infused by the majority of teachers in their curriculum.

	SA	A	N	D	SD
N =	3	5	14	63	26
% =	2.7	4.5	12.6	56.7	23.4

Total N = 111
Mean Response = 3.9 (1=Strongly Agree, 5=Strongly Disagree)

Objective 6: Finally, the majority of respondents perceived the environmental education course work they experienced as being at least as important (48%) or more important (47%) than other pre-service courses they experienced thus far in their education (Table 13).

Table 13

Question 13. Relative to other courses required in my pre-service training, I feel the content and methods in this course are:

	Most important	More important	As important	Less important	Least important
N =	26	27	54	4	0
% =	23.4	24.3	48.6	3.6	0

Total N = 111
Mean Response = 2.2 (1=Most Important, 5=Least Important)

Summary and Conclusions

Results indicate that mandates or requirements are effective at putting bodies in desirable places. At the very least, this is a beginning. Without the pre-service environmental education mandates in Wisconsin, very little opportunity would be provided to expose potential educators to the important role they play in determining a quality environment. Given the critical nature of environmental problems, it seems justifiable that society would require its educators to work with students toward the prevention and remediation of these life-threatening situations. Education students presently have very little flexibility in their schedules. Thus, without a required approach very few would elect to take such course work. Further, they may not have had previous exposure to the important nature of such topics. Thus, it is recommended that states and/or institutions look for some mechanism to require environmental education course work as a part of pre-service training, if they are serious about developing environmental literacy within their given population. A summary of how Wisconsin moved to institute environmental education in its pre-service teacher training has been prepared by Wilke (1985).

Of course, having pre-service education students in an environmental education course does not mean that desirable goals will be accomplished. In fact, forcing students to comply could result in resistance to and ultimately disrespect or lack of support for the intended goal. At UWSP, instructors decided they would have to provide a "convincing" environmental education experience

as best they could. Thus, a program was developed where pre-service students could discuss and experience how to teach certain environmental science concepts at various age levels at the same time they learned the concepts. Students overwhelmingly perceived this as desirable over the more common alternative of experiencing a content course and then sometime (maybe even years later) experiencing a so-called "related" methods course. To pursue such a program, we had to develop a pool of faculty who could do both (i.e., could integrate content and methods). This also was perceived as valuable by the students. Thus, faculty who had experience teaching environmental studies at various K-12 levels were employed over content specialists (i.e. an ecologist with no relevant teaching experience. The two factors of simultaneous content/methods and providing appropriate instructors seems to have contributed to the success of the course work.

To a degree, success of the course is determined by the fact that the majority or students completing the experience concur that their environmental education experience was, and is, an appropriate and desirable requirement. In fact, they perceived the experience as being at least as important if not more important than other education course work. At a time with so many disciplines bidding for the time of pre-service teachers, it was important to the instructors that students perceive their environmental education experience as a relative priority. Further success is determined by the fact that most course graduates see themselves as infusing environmental education into their classroom teaching. Of course, the best measure of success will be to follow up on these pre-service educators to see if they retain their support for environmental education and ultimately infuse it in their curricula.

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TEACHER EDUCATION IN ENVIRONMENTAL EDUCATION: THE 'GRIP OF PRINT' AND OTHER LESSONS FROM DISTANCE EDUCATION

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Introduction

This paper focuses on teacher education in environmental education. In seeking alternatives and improvements in EE teacher education, it is instructive to see what lessons might be learnt from efforts at distance education in this field. The paper will outline the structure and context of a teacher education course in environmental education--a course that is part of an off-campus (distance education) Bachelor of Education program--and then consider a number of curriculum issues that have arisen in the history of this course.

The course itself is located in a Bachelor of Education program at Deakin University and is available for practising teachers throughout Australia who are interested in upgrading their education qualifications without having to travel physically to the host institution offering the degree. The B.Ed. program comprises a number of 'generic' curriculum courses in such areas as curriculum design and development, educational enquiry and action research, and a number of 'specialist' curriculum courses in such areas as mathematics education, language education and art and music education. The environmental education course takes its place among the 'specialist' curriculum courses.

About 100 practising teachers enroll each year in the course Environmental Education. In 1989, the enrollment was 106, with a state-by-state distribution as follows:

Australian Capital Territory:	3	
New South Wales:	20	
Northern Territory:	1	
Queensland:	3	
South Australia:	1	
Tasmania:	0	
Victoria:	76	(19 in Geelong)
Western Australia:	1	

Of the 96 students in New South Wales and Victoria, only 36 reside in those states' capital cities; the remainder are spread around the country areas of the state. Of the 76 Victorian students enrolled in the course, only 19 reside in Geelong, the site of the university itself. That is, 66% of students enrolled in the course live in country areas, and less than 20% live within commuting distance of the university and are able to gain ready contact time with the developers and teachers of the course. Thus the course has to "stand alone"--to be independent of ready contact with its developers/teachers, and to be self-sufficient in terms of other forms of student support services. These student support services include distance education textual and audio-visual course materials, regional tutorials in major population centres, assistance in setting up student self-support groups, courier-assisted library loans, telephone tutorials and telephone conferences.

The costs of developing and servicing distance education courses like Environmental Education are not insignificant. External consultancy costs in the preparation of course materials for a one-semester course are likely to run to $7000; a course maintenance budget is likely to be in the vicinity of $3000.

The preparation, organisation and maintenance of a distance education course in teacher education in environmental education is a learning experience in that it throws into sharper relief a number of teaching and curriculum issues that tend to remain at a more subtle level in conventional on-campus teacher education courses in environmental education. One obvious reason for this is that the communication or discourse between teacher and student is made concrete in the form of permanent learning materials; another reason is that the university supports an infrastructure designed to monitor and record the responses and concerns of students enrolled in the courses and to feed these back to the course team.

The Grip of Print and Other Issues

Issue 1: The "grip of print" and the regulation of discourse

By definition, distance education courses depend on means other than direct face-to-face contact between teacher and student. As mentioned earlier, course development in distance education is expensive, and economic considerations require print runs in the order

of five years. As a consequence, distance education courses tend to suffer from the "grip of print", where the curriculum of the course is locked into a textual form for a significant period of time. Text production and reproduction are central processes in distance education.

The dependence of distance education on text production has been the subject of critique. Evans and Nation refer to the process as "instructional industrialism" (Evans and Nation, 1989, p. 245). They quote Sewart, who claims that "There is a beguiling temptation to assume that the problems of teaching at a distance can all be solved by the production of an as yet merely hypothetical perfect package of material" (Sewart, 1983, p.48).

The essence of Evans and Nation's critique is that the "instructional industrialism" process is based on behaviourist assumptions about how students learn, and about the proper relationship between learners and teachers. They claim that approaches that depend on central learning materials development followed by dissemination of prepared materials to a learner at a distance serve to reinforce the view of learners as passive receivers of the knowledge of others:

> "Distance teachers use their temporal and spatial autonomy from their students to select and shape the knowledge which the students must learn for success. Through their use of 'industrial' teaching practices, distance teachers regulate the forms of discourse in which the students can engage." (p.246)

If it is accepted that professional development courses ought to aim at improving the capacity of (often isolated) practitioners to deal autonomously with the teaching and curriculum issues of their profession, then it is of concern if the very medium of distance education can serve as a device for establishing and maintaining a form of intellectual control over the distant student.

Issue 2: The loneliness of the long-distance learner

As can be seen from the distribution figures for the course Environmental Education, distance education students are spread thinly on the ground. Only in the large population centres is it likely that other students can be found within reasonable proximity. Consequently, many distance education students are forced to engage in individual studies. There is little opportunity for

students to gather together and form a "critical community" capable of assessing, critiquing and reinterpreting the texts of the distance education courses. Distance learning can reinforce individualism.

The individualising influence of distance education can express itself in at least two ways in environmental education. Students who have difficulties with the implicit "environmentalism" of the course tend to blame themselves for not being able to control their interactions with the environment; little recognition is given to the situational (social, political) influences that shape human relationships with environments and over which individuals have little control. And secondly, difficulties and failures in coming to grips with the assessment tasks built into the learning materials are often internalised in the absence of opportunities to communicate with the developers of the materials. Both the substantive messages and the learning processes built into distance education courses can act to subordinate the learner:

> "Teachers have varying degrees of autonomy and power over what they teach (curriculum) and how they teach (pedagogy). The distance teacher's autonomy and power are both circumscribed and enhanced by the context of distance education. In effect, both curriculum and pedagogy are structurally prefigured by the institution. However, the nature of the prefiguration is such that students are structurally confined to dominated and alienated positions within the teaching-learning relationship." (Evans and Nation, p.246)

In the case of environmental education, distance educators engaging in course development participate in selecting, labelling, ordering, packaging and disseminating knowledge. Typically, students are insulated from the course team's assumptions about "environment", "education", "environmental education", "social and political life" and so on. Yet in distance education these invisible assumptions may be crucial in reproducing existing interactions between humans and environments, with all their inadequacies. For example, consider the knowledge prepared in two different distance education courses in environmental education by distance educators with different ideological positions such as "education <u>about</u> or <u>in</u> the environment" and "education <u>for</u> the environment" (see Fensham, 1979; Greenall, 1981; and Lucas, 1979). The former course may emphasise the importance of nature trails and basic ecological

principles and engage in activities that aim at appreciation and appraisal of the environment as it is; the latter may emphasise the need for a socially- and environmentally-critical perspective and engage in activities which aim at critiquing current human-environment interactions and creating the conditions for environmentally-positive changes in these interactions. Both courses will probably carry the label of "environmental education", yet only one has the capacity of reconstructing human-environment interactions. Such a "slogan system" (see Popkewitz, 1983, p.16), in which a range of practices take for themselves the catchcry name of a curriculum initiative like "environmental education" and thus create the conditions for name-only reform, can be a powerful factor in social and curriculum reproduction. The disempowering relationships inherent in distance education, which tend to deny the learner the opportunity to communicate with teachers and other learners about such issues, exacerbate the situation.

> "Distance education uses its textual, curricular and pedagogical processes to marginalize and dissolve the self-directedness of people's learning, and confines them to a system of learning which reflects and aids the reproduction of the ideological and structural conditions of society," (Evans and Nation, p.249).

Given that one of the aims of environmental education is to change and improve the relationship between humans and their environments, the capacity of distance education/teacher education courses in environmental education to contribute to the reproduction of social/ environmental conditions is another serious concern.

Issue 3: The fit of environmental education in the curriculum

Perhaps more so than any other subject matter in the school curriculum, environmental education is manifold in its expression, and in the "homes" it finds in the curriculum. A recent research project in environmental education demonstrates this manifold expression and location.

In a project in the state of Victoria, seven schools are exploring the role that a computer conference can play in enhancing their environmental education program, which is based on the testing of bacteria levels in the swimming beaches along the country's premiere surfing

coast. The following profile indicates the subject or course in which the project activities are conducted:

*School 1: year 11 marine studies; year 12 Biology; year 11 & 12 science club (an elective lunchtime activity);
*School 2: year 11 & 12 STC (Schools/Tertiary Entrance Certificate);
*School 3: year 11 Biology;
*School 4: year 12 Chemistry option;
*School 5: middle secondary "science enrichment";
*School 6: year 9 & 10 science electives (10 week blocks);
*School 7: year 11 & 12 STC; year 10 General Science.

The point to note about this is that despite a very narrow substantive focus in each environmental education program--which in all schools was based around the systematic testing of levels of bacteria in the seawater of popular swimming beaches and therefore did not involve many degrees of freedom--the programs took place in four different year levels and in several different courses, none of which carried the same name. There is evidence that in order to gain a foothold in the curriculum, environmental education has to engage in "solicitous surrender"--to voluntarily give up something of its identity (its very name) and to associate with established discipline-based subjects in order to gain the necessary resources (curriculum time and space).

It is difficult to foreshadow how environmental education will be expressed in schools; the nature and extent of solicitous surrender necessary to secure a position for environmental education in particular curriculum settings can only be determined practically by participants through their efforts at such consolidation. Environmental education problems are doubly idiosyncratic (Robottom, 1987a, p.297):

> "The <u>environmental</u> issues that form the substance of environmental education work are usually specific in time and space (this is simply to say that environmental conditions in different parts of the world are different); and <u>educational</u> problems are rarely susceptible to universal solutions (this is to say that the ecology of classrooms differs from classroom to classroom)."

Given the manifold expressions of environmental education and the variety of "homes" it finds in the formal secondary curriculum as a result of curriculum

trade-offs, it seems inappropriate for distance education courses to attempt to structurally prefigure (shape and constrain) curriculum content for environmental education students. To do so denies the reality of the struggles that teachers of environmental education have to join in order to make a place for environmental education in the curriculum.

Issue 4: Appraising the success of environmental education

There are strong claims that environmental education ought to be an interdisciplinary influence rather than self-sufficient disciplinary subject (UNESCO, 1972). Also, there is an argument that epistemologically at least, science is an inappropriate vehicle for environmental education in the school curriculum (Robottom, 1983). Yet it is true to say that much of the environment-related study that takes place in schools remains associated with General Science, Chemistry, Biology and Geography: science tends to be regarded as the disciplinary base of environmental education (Robottom, 1987b).

It is important, given the interdisciplinary aspirations of environmental education, not to allow the apparent science-relatedness of much environmental education curriculum to tempt us to apply conventional disciplinary criteria when appraising the success of environmental education. Such criteria as individual discreteness, university approval as matriculation subjects, and professorships in university departments may well be inadequate measures of the success of environmental education, and lead to a devaluing of the achievements of environmental education over the last decade or so. In short, there is a need to wear the right glasses when appraising the success of the impact that environmental education has had on the curriculum.

"Open Text" in Environmental Education Teacher Education

In recognition of the kind of issues outlined above, Evans and Nation describe a way of working with text that may obviate some of the dangers of "instructional industrialism". They cite Wexler in pointing to the possibility of "open texts":

> "The open text invites participation. It refuses the assumption of a reproduction of fixed forms as the basis of expression and communication. The open text is a process of

> activity rather than a dead object. Texts can be open to the continuing work of transformation, which is a form that teaches activity rather than passive consumption as its message. The presentation of ambiguity, of a text which remains unexhausted even after systematic interpretation grids are placed over it, 'structurally prefigures' a world of indeterminacy, of possibility." (Wexler, 1981, p.289).

How can we actually do this in distance education in environmental education teacher education? Perhaps the only way to answer this question is to examine the practical experiences of courses actually designed with the issues in mind. While in no sense presented here as a universal solution to the issues cited above (in fact it may itself be a part of the problem), the Deakin University environmental education course has attempted to grapple with these issues. A brief account of the structure and some of the assumptions of the course is given below.

Physically, the course comprises a course guide (which outlines the assessment requirements of the course), a monograph, and a ringbinder of task statements and course- related readings, most of which are recent journal articles. The monograph has a print run of five years; the course guide and ringbinder are renewable annually.

The monograph includes a number of essays aimed at presenting a politicised view of environmental education at the levels of theory, organisation and practice. The task statements outline contemporary research issues that the students are invited to address through participatory environmental, community and classroom research; the statements are supported by the sample of relevant readings that the students are required to critique in the light of their own research. Thus the course is <u>research-based</u> (the "knowledge" of the course is generated by the students' own enquiries), <u>community- based</u> (students are required to engage environmental problems in their own communities) and <u>practice-based</u> (the students are required to engage contemporary environmental education issues through research into their own teaching practices). The course is interested in <u>improved environmental and educational theorising</u>, and attempts to align itself with an "information critique" paradigm of professional development in environmental education (Robottom, 1987a).

It is too early to say whether a course that is research-, community-, and practice-based in these terms can achieve the idea of Wexler's "open text", but an encouraging sign is the diversity of insights evident in the work of the students as they engage environmental, teaching and curriculum issues of interest and concern to them in their environmental education contexts.

Conclusion

This paper has attempted to present some lessons from distance education for the field of environmental education teacher education. The points raised are:

*the very medium of distance education can serve as a device for establishing and maintaining a form of control over the distant student-- a form of control that is at odds with the idea of professional development.

*distance education/teacher education courses have the capacity to contribute to reproduction (rather than transformation) of social/environmental conditions and relationships.

*there is a tension between the tendency for distance education/teacher education courses to structurally prefigure (shape and constrain) curriculum content for environmental education students, and the unpredictability of the outcomes of the struggles that teachers of environmental education have to join in order to make a place for environmental education in the curriculum.

*the inappropriateness of conventional criteria for appraising the success of the impact that environmental education has had in the school curriculum.

*the need to continue to explore alternative ways of working with text that may obviate some of these dangers of "instructional industrialism".

This paper has nominally been about distance education. However, the messages are only less obvious in other kinds of professional development of teachers of environmental education. An important research question is whether there is adequate recognition of the role that "the grip of print" and "instructional industrialism" can play in creating and maintaining counter-

productive power relationships in teacher education in environmental education.

Note

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COOPERATIVE MODEL FOR IN-SERVICE ENVIRONMENTAL EDUCATION IN THE STATE OF KANSAS

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Introduction

Outlined in this paper is a strategy for an annual environmental education in-service workshop that explores the total school curriculum. Teachers, pre-service college students and educators from non-formal settings attend. College credit is optional. The two-day workshop (last year's program emphasized "Teaching Critical Thinking Through Environmental Education") is purposefully scheduled immediately prior to the Kansas Association of Teachers of Science (KATS) meeting (over 700 K-college teachers attend). The workshop is organized by the Kansas Advisory Council for Environmental Education in cooperation with State of Kansas agencies, KATS, environmental groups and school representatives. Strategies for conceiving, organizing, publicizing, presenting, and evaluating the annual workshop are presented below, and suggestions for other states are discussed.

A Kansas Perspective

For the state of Kansas, environmental education is the interdisciplinary process of providing students, our future citizens, with the tools to make decisions and take actions which will lead to optimal relationships between humans and the environment. Students need to examine their environment through the scientific and technological dimension. Just as importantly, they must consider the importance of social and aesthetic factors in decision making.

Most environmental deterioration is a result of human action. To become better decision makers, students need to not only understand the components and structures of the physical and biological environment but the interrelationships as well. Only then can a conceptual framework exist for interpreting the impact of both the scientific and technological on the present and on future conditions.

The development of good management practices for the environment is a complex undertaking. Public policy and environmental decision making is deeply rooted in social, political, and economic issues. It is difficult, if not impossible, to avoid controversy in studying valid environmental issues. Students must become aware of what is happening in the world around them; they need to look at issues through the eyes of various interest groups holding very different ethical views.

To be effective, environmental eduction must get away from an emphasis on a superficial environmental "awareness." Our future citizens, as participants in a democratic society, must understand how values and ethics enter into the problem-solving and decision-making process. The above is not recommending values clarification or the indoctrination of any set of values, rather a close examination of the various ethical systems that exist today and how they affect national, state, and local environmental policy.

Aesthetic considerations are essential in understanding environmental decision making. Students need to develop a feeling for aesthetic order and a comprehension of the principles that form and shape the environment. The individual student needs to be provided opportunity to make a responsible commitment to develop the aesthetic value judgments aimed at preserving and enriching the interaction of humans with their environment.

In environmental education settings, it is valuable to use instructional strategies that consider the learner an active participant in the process. The teacher should encourage the development of skills for observing, classifying, interpreting, and predicting. Students should debate with one another, sharing ideas and perspectives. The need for "hands on" experiences with their biological and physical world is essential for formulating the intellectual and aesthetic framework for future decision-making.

Environmental Education In-service through KACEE

For the most part, Kansas elementary and secondary teachers are not comfortable with or equipped with the tools to teach an interdisciplinary approach to environmental education that emphasizes problem-solving, ethics and aesthetics. The Kansas Advisory Council for Environmental Education (KACEE), as a state-wide organization, has recognized these needs and has organized a

series of workshops that assist classroom teachers and non-formal educators to become better environmental educators. This paper presents a workshop strategy that piggybacks on the annual meeting of the Kansas Association of Teachers of Science. On the following pages is a description of the workshop offer last year, "Teaching Critical Thinking Through Environmental Education." The two-day workshop was attended by over 100 pre-service and in-service teachers.

Initial Workshop Planning

The workshop idea had its genesis at the preceding fall state meeting of the KACEE membership. About one-half of the membership is made up of educators from the K-12 schools, colleges and universities, and nature centers and museums. The other half is made up of individuals representing local, state, and federal agencies, and the private sector (e.g., State Department of Environment and Health, Southwestern Bell Telephone, U.S. Army Corps of Engineers, Soil Conservation Districts, Fish and Game Associations, Audubon Society).

It was decided at the fall meeting that KACEE should target its effort on an in-service activity for elementary and secondary teachers that addressed the complex environmental issues facing Kansas. It was concluded that the in-service should have a dual purpose conceived around the concept of teaching critical thinking about environmental problems and issues. The first purpose would be to provide an update of "facts" and knowledge (content) about environmental topics. The second purpose would be to explore the various instructional strategies, curricula, and resource materials that teachers and non-formal environmental educators could use in designing interdisciplinary lessons that emphasized critical thinking about environ-mental issues. In addition, it was decided that the workshop should be held in an instructional environment where both formal and informal instruction could occur.

After reviewing potential facilities in the state, it was concluded that the Rock Springs 4-H Ranch was the ideal location. This facility provides excellent classrooms, housing, and meals as well as a variety of terrestrial and aquatic ecosystems. Nestled in the beautiful Flint Hills country of Kansas, the site is an ideal for both formal and informal instruction.

Once the general theme, "Teaching Critical Thinking Through Environmental Education," was established by the

membership, the detailed planning was delegated to the executive committee. They determined that the overall purpose of the workshop was to offer at all grade levels experiences for teachers, administrators, and professionals working in non-formal settings (i.e. nature interpreters, rangers, park aides, etc.) that enhance their abilities to teach critical thinking skills within environmental education programs. In turn, activities were selected that centered on the study of natural and man-made environments. Participants would learn about ecology, astronomy, geology, botany, economics, political science, environmental issues, and new programs and instructional strategies pertaining to environmental education.

Six goals were set to organize the planning process:

1. Develop critical thinking techniques using environmental education materials.

2. Explore K-12 resource materials and programs in environmental education, including OBIS, Project Learning Tree, Project Wild, Outlook, and the CLASS Project.

3. Acquire strategies for developing positive attitudes toward using environmental skills and concepts within the existing curriculum.

4. Become aware of the major environmental issues that face Kansans today and in the future.

5. Become informed about the political and governmental decision-making processes that legislate and regulate the use and management of natural resources.

6. Become updated about environmental science content/process.

The workshop was designed to be both activity- and discussion-oriented, with minimal emphasis placed on formal lectures. Also, it was stressed that there would be something for everyone.

The next step was for the KACEE Executive Committee to decide when to hold the workshop. Since the Kansas Association of Teachers of Science (KATS) already held an annual spring meeting at the Rock Springs 4-H Ranch facility, it was suggested that KACEE join this effort by piggybacking on the program. To maintain a separate identity, which was deemed critical by the executive

committee, it was decided to hold the workshop immediately preceding the KATS Conference--always held the Friday evening and the weekend of the third week in April.

It was decided to begin the KACEE workshop the Thursday evening before and continue through all day Friday. This proved to be an excellent decision. The leadership of KATS saw our effort as complimentary by strengthening its program through providing a "pre-conference" theme that had been requested by the membership over several years. KATS agreed to cooperate on housing and to work with us on choosing a Friday night speaker who could serve as a bridge between the two groups.

Many of the teachers who enrolled in the KACEE workshop indicated they had not planned to attend the KATS conference, but they did because they were already on site. The reverse was also true--those who were planning to come to the KATS meeting decided to arrive a day early and take advantage of the environmental education workshop. Thus, the back-to-back meetings became a win, win situation for all involved.

Publicity and Recruitment

A variety of ways were used to publicize the workshop. An announcement was placed in various newsletters, newspapers, and professional journals in Kansas (KATS NEWS, Middle School Newsletter, KACEE Newsletter, KNEA publications, Regional Service Centers Newsletters, etc.) In addition, a mailing was sent to the membership of the teachers organizations in science, social studies and environmental education, as well as the State Department of Education mailing list for selected schools, elementary teachers, and secondary science teachers. Overall, this resulted in a 2,000 piece bulk rate mailing. Because the KACEE announcement could be included with a mailing already being sent by the Science/Environmental Education coordinator of the Kansas State Department of Education, there was no cost involved other than duplication of the inserts.

To insure additional credibility for the workshop, particularly for administrators and teacher who had never heard of or dealt with KACEE, the application form was returned to the State Science/Environmental Education coordinator, an individual who is widely known throughout Kansas and who could be contacted with questions and concerns.

Budget

KACEE, as most "grass roots" environmental education organizations, had no budget to support the workshop activity. It was decided by the KACEE president that his home institution, Kansas State University, would bankroll the workshop expenses (copying, secretarial, postage, phone calls, etc.), and if there was a "profit," bill the organization for the expenses.

The registration fee was set at $35 per participant. This included three meals, coffee breaks, and overnight lodging. With over 100 registrants, sufficient revenue was raised to provide for all the expenses and still generate about $1000 of surplus to be used by KACEE as seed money to keep the workshop activity going.

KACEE members were concerned that the fee would keep people from enrolling. Just the opposite turned out to be true. In most cases the school districts and other agencies sending participants were more than willing to pay the fee. Numerous teachers commented that for what they get out of the meeting the price was a bargain.

College Credit

It was debated in the executive committee whether or not to offer college credit for the workshop. As an experiment, KSU decided to offer special undergraduate credit for teacher education undergraduates who attended. The students had a choice between a biology credit or an education credit. The two instructors (from the Department of Curriculum and Instruction and the Division of Biology) planned the offering and evaluation scheme together. Of the 13 undergraduates who attended, 12 registered for credit.

The course descriptions and requirements are outlined below:

Courses

EDCI 397 (ref. 07020): Topics in Biology, 1 credit, OR
EDCI 502 (Ref. 29530): Independent Study in Curriculum and Instruction, 1 credit.

Requirements

A. Attend all sessions both Thursday and Friday, April 21 and 22.

B. Keep a log (detailed notes) for all sessions attended at the workshop (including handouts).

C. Based on the notes and handouts, prepare a set of activities for three class sessions at the anticipated grade level you expect to teach. Outline these activities using the lesson planning format you received in the elementary science methods class. Each lesson plan should contain at minimum the following: aims (overall goals); objectives; detailed procedures (operationalized); materials, preparations, A-V, etc.; assignments, and an evaluation plan. If you prefer, the attached suggested format can be substituted. Please see the instructor for a translation. Since the theme of the workshop is teaching critical thinking skills through environmental education, a significant number of your objectives need to promote problem-solving and critical thinking, appropriate for the selected grade level.

D. Submit your log and lesson plans by May 9 to the appropriate instructor.

Selection of Workshop Offerings

Those enrolled for BIOL 397 credit need to attend "Content" concurrent sessions. Those enrolled for EDCI 502 credit are free to choose between the "content" and the "pedagogy" concurrent sessions.

Criteria for Grading

1. A detailed and accurate log (notes) and a complete collection of handouts.

2. One week of lesson plans that have:
   a. An appropriate selection of environmental education concepts.
   b. A selection of clear goals, objectives, and activities for the appropriate grade level.
   c. A selection of critical thinking skills appropriate for the ability level of the students.
   d. A hands-on set of activities that involves all students.
   e. A complete set of instructions so that another teacher could instruct the lessons without consulting the author.
   f. A detailed plan for evaluating the students obtainment of the objectives.

g. Attached a copy of student handouts, A-V materials, etc.

Agenda for the Workshop

The workshop agenda balanced content and pedagogy between lectures and hands-on experiences, the theoretical and practical, and the subject-specific and interdisciplinary. The workshop staff was carefully selected to provide a good mix of environmental educators, university scientists, state and local government agency personnel, classroom teachers and interpreters, and individuals from the private sector. To give the reader a sense of this balance, an abbreviated agenda is out-lined below for consideration. The presenters' names have been replaced with the professional role each plays in society.

Agenda

April 21 6:00 Registration and check in for lodging

6:45 Welcome and Orientation to the Workshop --President of KACEE

7:00 "Environmental Education: Past, Present, and Future"--Assistant Secretary, Kansas Department of Health and Environment Health

7:45 "Teaching Critical Thinking through Environmental Education Activities: A Strategy"--State Environmental Education Coordinator/State Forester

8:15 Break and Informal Discussion

8:30-10:45 (Repeated Sessions)
A) Night Hike--University Biologist/Elementary Teacher
B) Night Sky Investigation--Middle School Astronomy Teacher
C) Hands-on Critical Thinking Activities--State Environmental Education Coordinator/State Forester

Sessions were repeated at 9:15 pm and 10:00 pm.

An inclement weather plan was also developed:

8:15-10:30 pm (Repeated Indoor Sessions)
A) Environmental Film
B) Hands-on Critical Thinking Activities

Sessions to be repeated at approximately 9:15 pm.

10:45 pm Hot cocoa and popcorn

April 22 7:00 Breakfast

8:00 Kansas Environmental Issues: An Overview--Environmental Scientist from Kansas Department of Health and Environment

8:30-10:15 Small Group Session 1

Elementary (1-6)	Secondary (Middle School - High School)
*Project Wild--Middle School and Elementary School Teachers	**Air Quality and Solid Waste Issues-Environmental Scientist
**Geology of Kansas Environments--State Geologist/Middle School Earth Science Teacher	*Project Learning Tree--Environmental Educator
**Soil and Water Conservation Practices and Issues--Soil Scientist/Environmental Educator	*CLASS Project--Environmental Educator

10:30-12:15 pm - Session 2

Elementary	Secondary
*Project Learning Tree--Science Supervisor	**Forestry Environments, Concepts, & Principles--Forestry Professor
**Partners with Wildlife--Fish and Game Department Public Educator	*Project Outlook and Developing Campus Nature Center--High School Biology Teacher
**Air Quality & Solid Waste Issues--	**Long-Term Effects of the Greenhouse Effect--

Environmental Quality Engineer — Geology Professor

1:30 - 3:15 pm Session 3

Elementary	Secondary
*Outlook and Developing Campus Nature Centers--High School Science Teacher	*Supermarket Syndrome vs Product System (Film: Toast)--Community College Instructor
*Starting an Outdoor Environmental Education Site--Elementary Teacher	*Partners with Wildlife (Repeat)
**Long-Term Effects of the Greenhouse Effect--University Geologist	**Geology of Kansas Environments (Repeat)

3:30 - 5:15 pm Session 4

Elementary	Secondary
*OBIS--University Environmental Educator	**Starting an outdoor environmental education site (Repeat)
**Forestry Environment Concepts and Principles (Repeat)	**Soil and Water Conservation Practices and Issues (Repeat)
*Triple E Trip for Enhancing Environmental Education--Representative from County Sportsmen's Group	*Recycling Projects--Executive Director of Non-profit Recycling Organization

5:20 Evaluating Student Achievement and Attitudes in Environmental Education--University Environmental Educator

6:00 Developing Public Policy for Dealing with Kansas Environmental Issues: A Perspective--Staff member from the lobbying group, Kansas Natural Resources Council

6:45 Wrap-up Session--Where do we go from here?--KACEE President/State Environmental Education Coordinator

7:00-8:00 Registration and Dinner at the KATS KAMP

8:00 Dr. Minaruth Galey (KATS KAMP Speaker) "You, Me, and Technology"

*Pedagogy--Curriculum and Instructional Strategies
**Content - Discipline-based Concepts and Principles

To insure as much as possible good attendance at each of the concurrent sessions, admission tickets were distributed on a first-come basis during registration. No more than 20 tickets for each workshop were put out on the "sign-up" table. To assist the participants in their decision-making, a one-page description of each concurrent workshop was displayed behind the pile of admission tickets. We asked each presenter to collect the admission tickets. In monitoring the sessions, 90% of the participants went to the sessions for which they held a ticket. Others negotiated their way into the sessions. We asked the presenters not to be hard-nosed about it. There was even evidence that teachers who arrived near the end of the registration period successfully bartered or negotiated the swap of tickets. Overall, this scheme did provide some fidelity to the activity by the fact that the smallest concurrent session had 12 people present.

Workshop Evaluation

A formal evaluation was placed in the registration packet of the participants. They were asked to evaluate each session attended and to provide general feedback on ways to improve the workshop. The overall evaluation was very positive. We received many comments that having the KACEE workshop just prior to the KATS Conference was an excellent idea. The participants particularly liked the hands-on activities that provided them with materials and resources that could be incorporated immediately into their instructional settings. They also found the mix between content and pedagogy sessions to be a helpful way to organize the workshops.

General concerns centered around not enough sessions for special interest groups and not being able to attend some sessions because of the unavailability of tickets. We were told over and over that KACEE needs to publicize the next workshop at least a year in advance so it can be put on each school system's calendar. This would cut down on the hassle of making last minute arrangements.

A number of other specific recommendations included:

(1) More activities out-of-doors. For example, about 15 participants found the night hike experience unique and very rewarding.

(2) More presenters that have developed home-grown environmental education projects and programs from different types of schools (rural, suburban, and urban settings).

(3) More opportunity to learn about the programs and resources available from nature centers and other non-formal educational organizations.

(4) More detailed program sent out ahead of time that described each of the concurrent workshops. This would greatly aid the participants in the selection process.

(5) Have planned regional follow-ups, with specific workshops that provide detailed training in some of the instructional projects such as Project Learning Tree and Project Wild. Arrange it so individuals could sign up for them at the KACEE Workshop.

(6) Provide training for supervisors and others who would like to organize a similar workshop on a local or regional level.

(7) Spend more time helping the teachers define critical thinking and how to integrate it into the classroom. Provide a handout that outlines the strategies.

(8) Spend more time on learning to evaluate critical thinking in environmental education by using small groups for instruction.

Hints for Other Organizations

In reviewing the overall process of organizing and carrying out the KACEE workshop, there are additional recommendations other organizations should consider before conducting a similar activity:

1. Early Planning. The planning of the activity needs to begin at least 18 months in advance. This will allow for the development of a quality program that

can be systematically publicized. In our case, we did the planning in a little less than six months. This prevented the recruitment of some outstanding workshop presenters who already were committed to other activities, and placed great stress on the "volunteer" staff who lived with a very tight schedule day-by-day.

2. Length of Workshop. It would be helpful to expand the workshop to two full days. This would allow for more and longer concurrent sessions, provide time for field trips to area sites to conduct various nature study activities, etc. Also, there would be time to have brainstorming sessions with small groups by grade level and type of role played in environmental education.

3. Broadening the Base of Participation. The participants recruited should be expanded to include a broader base of educators. In our case, there was a modest attempt to bring in social studies educators with the result that a few attended, but this area of recruitment needs strengthening, with specific workshops for social studies educators highlighted. Art educators, music educators, agricultural educators, and home economic educators were not specifically recruited for the workshop. Since all provide a multi-disciplinary perspective to environmental education activities, their attendance would encourage an exchange of ideas.

   One way to broaden the base of participation would be to hold the workshop yearly on an alternate schedule between the social studies, art and science teacher organiza-tions, just prior to each of their annual meetings. Teachers from all ranks and subject areas would be invited, but the overall theme and goals emphases each year would reflect the specific area of the teachers' group holding the annual meeting.

4. Earned Credit. The teacher participants in particular requested that the workshop offer an optional 1-2 hrs of college credit through arrangements with universities throughout the state. This would help with re-certification plans and in many cases add to the credits needed to advance on the salary schedule. Also, many school systems in Kansas have approved individualized in-service plans where the teacher can negotiate self-improvement activities that substitute for college credit (20 in-service points are equivalent to one college

credit). Attendance at the workshop with follow-up planning back in the school district could count toward the in-service points if the workshop staff would become involved in certifying that the individual did perform the tasks outlined in the approved in-service plan.

5. Early Publicity. Most school systems set their in-service calendars and allocate budgets for in-service a year in advance. Because we announced the KACEE Workshop less than four months in advance, many school administrators were unwilling to release the teachers. Our saving grace was the fact that the workshop was held the day proceeding the KATS Annual Meetings and administrators took advantage of the reduced transportation costs with back-to-back meetings. Many of the participants would not have been able to attend if it had not been for the KATS meeting. It is strongly recommended that you attempt to get on school district calendars throughout your region.

6. Workshop Task Force. Organize early a number of task forces to handle all specific duties for the workshop. There is a specific need for a task force to: (A) coordinate the overall organization of the workshop, (B) select the speakers and concurrent workshop instructors, (C) handle on-site preparation and registration, (D) publicize the workshop, (E) evaluate the workshop, and (F) prepare proceedings and/or follow-up correspondence with the participants.

Summary

Hopefully, the detailed description of the KACEE Environmental Education workshop format will be helpful to others desiring to organize similar events. You must prepare yourself for a lot of hard work and for unexpected glitches in putting together all the pieces into a smoothly functioning activity. At the last minute, we had speakers cancel because of illness or in one case just "forgot" to show up. You definitely need to send out reminders (which we did not) and have a back-up plan to fill in the open spots. In our case, members of the executive committee jumped in with spur-of-the-moment presentations where needed.

After the workshop was completed and the staff was exhausted, we held a short debriefing meeting to discuss, Where do we go from here? We were even questioning

whether it was worth it and should we or could we marshal the effort to conduct a similar project in the future. One member of the executive committee leafing through the evaluations ran across a statement from an elementary teacher that made it all worthwhile. The teacher wrote, "I have always found it very difficult to teach science and environmental education. I now have a wealth of materials and ideas to take back to my classroom Monday. I can't wait. Watch out kids, here I come."

STUDENT DROPOUT PREVENTION: TEACHER IN-SERVICE CONNECTIONS TO ENVIRONMENTAL EDUCATION

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Introduction

The statistics related to dropout are startling. Nationwide, at least 700,000 students drop out annually. In some school districts, less than half of the students graduate from high school, with many students dropping out by ninth grade. Students just don't suddenly drop out of school; their at-risk status can often be predicted as early as fourth grade.

It is well known that standard instructional patterns have not worked for at-risk students. These students are often deficient in basic skills and find school boring and intimidating. But their non-achievement can be related to other factors as well, ranging from social behavior, peer relations, drug abuse, learning style to family-based problems. Even gifted students can be considered at-risk due to boredom (Table 1).

Schooling must change so that it meets the needs of all students. One of the potential contributors to the solution of the dropout problem is the infusion of environmental education into the curriculum. Intrinsically, environmental education offers motivating and relevant content. A variety of environmental education curriculum guides are available which provide materials and methods conducive to interdisciplinary infusion, different learning styles and cooperative learning groups. But, the heart of environmental education is interdependence, whereby everything is connected in some way. This connectedness can be applied to self, peers, school, home, and community, thus providing a natural way to expand the curriculum to meet the needs of at-risk students.

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During the past year, a preliminary study was conducted on the effectiveness of "Environmental Education as Dropout Prevention" as the basis for in-service programs targeted at fourth through twelfth grade teachers. Included in this study was the development of in-service programs using well-known environmental curriculum guides, the collection of implemented lesson plans with journal entries by teachers on their effectiveness, and a final evaluation by involved teachers to guide future in-service efforts.

The In-service Programs

Twenty-six teachers volunteered to participate in the in-service programs. The participants had the following affiliations:

- 11 elementary teachers (grades 4, 5, 6) from two schools
- 9 middle school teachers (grades 6, 7, 8) from three schools including 5 members of a team representing reading-language arts, science, social science, and math; 1 basic skills teacher; 3 teachers of self-contained classes for identified at-risk students.
- 6 high school teachers including 2 social studies teachers at an alternative high school (grades 10, 11, 12); 4 teachers in an alternative program within a regular high school (grades 9, 10).

Components of the two-day workshops are shown in Table 2. Many of the components are self-explanatory; however the "principles for implementation" are unique to the in-service program. These principles include:

- Target environmental lessons to needs of specific at-risk students while planning for entire class
- Infuse environmental activities which reflect content of texts
- Post a definition of environmental education appropriate for grade level/subject in classroom
- Use the out-of-doors at least once per week as part of school-based implementation of environmental education
- Use cooperative learning groups when possible

- Consider extending or modifying an environmental concept to link it with at-risk student problems related to personal characteristics and school, family, and other factors
- If possible, include home activity to involve parents
- Plan for interdisciplinary applications (Required for middle school team).

Only the middle school teams which were utilizing environmental topics via interdisciplinary activities with a core curriculum selected a third day for planning. All teachers participated in at least one afternoon follow-up meeting at their school site.

Table 1. Characteristics of At-Risk Students*

A. Student Characteristics
1. Low self-esteem and self confidence
2. Lack of motivation
3. Behavior problems (aggressive)
4. Poor peer-group relationships
5. Poor listening/study/organizational skills
6. Does not respect authority (parent/school/teacher/principal)
7. Physical/health problems
8. Quiet/shy/withdrawn/loner
9. Highly distractable/short attention span
10. Poor nutrition/medical care/hygiene
11. Lack of sense of responsibility
12. Negative/hostile attitude toward life/school
13. Learning handicapped/different learning styles
14. Involved with drugs/alcohol/crime/cult
15. Depressed
16. Self-centered

B. School-Related Factors
1. Absenteeism/truancy/frequent tardiness
2. Poor grades
3. Low math and reading scores
4. Lack of identification with school; feelings of not belonging
5. Failure to see relevance of education to life experiences
6. Gifted and talented student (frequently bored with school)
7. Disruptive behavior and rebellious attitudes toward authority
8. Verbal deficiency

9. Usually "loners" and generally not accepted by their peers
10. Unable to tolerate structured activities
11. Lack of participation in school & extra-curricular activities
12. Discipline problems
13. Suspensions/expulsions
14. Poor relationships with teachers and/or classmates
15. Seldom question or reason critically
16. Demonstrate failure syndrome by habitually refusing to try and by being easily discouraged
17. Feel alienated, isolated, insecure and inadequate
18. Older than classmates
19. Irrelevance to personal needs/desires
20. Difficulty of classwork
21. Lack of accomplishment
22. Feeling of being out of place
23. Lack of encouragement to stay in school
24. Immediate gratification

C. Family-Related Factors
1. Excessively stressful home life
2. Communication between home and school is usually poor
3. Non-English speaking home
4. Lack of parental emphasis on the importance of education
5. Lack of parental support
6. Lack of role models at home
7. Mobility of family

D. Non-School Related Factors
1. Friends are outside of school, usually older dropouts
2. Work offer
3. Desire to work

*List of characteristics compiled from those found in several national studies, a local school district survey, and teacher participants in study.

Table 2. Overview of Components of In-service Program

1. What does "environmental" mean?
2. Why is environmental education important?
3. Characteristics of potential dropouts (Table 1).
4. Overview of Project WILD and Project Learning Tree.

5. Learning styles (4-Mat System).
6. Cooperative learning.
7. Introductory activities to environmental guides.
   For all teachers: Project WILD, Aquatic, Project Learning Tree, Teaching Basic Skills through Environmental Education Activities.
   Elementary school teachers: The California Environmental Education Guide (K-6).
   Middle school teachers: California CLASS Project.
8. Principles for implementation.
9. Examples of modified or extended lesson plans.
10. Group planning of lesson plans.

Table 3. Examples of Environmental Activities Applied to Meet the Needs of At-Risk Students

Summary of Concept and Activity	Source	Needs of At-Risk Students*
People and wildlife have the same needs. Students conclude what each person does makes a difference.	Project WILD- "Oh Deer!"	A-11,13 B-5,10
Chemicals in the environment and our bodies can be bad. A chemical problem may cause a domino effect. The idea of healthy world-healthy body is applied to alcohol and drug abuse.	Project WILD- "Deadly Links" CLASS Project- "Fowl Play"	A-10,11,13,14 B-19
Habitat Components are food, water, shelter, space in a suitable arrangement. What happens when a component is missing? How are students like the components? Each contributes vitally to class, family, world.	Project WILD- "Habitat Lapsit"	A-1,2,3,4,6, 11,12 B-4,11,14 C-6
Wildlife and people need nourishment, time, and care to grow.	Project WILD- "Bearly Born"	A-1,10 B-5,9,13 C-1

Compare own development to that of a bear.		D-1,2,3
Everything in nature is interconnected. Students interconnect with yarn based on friendship, giving, strengths shared with others.	Project Learning Tree- "Web of Life"	A-1,4,5,16 B-10,14
Wildlife is used in advertisement. Students relate influences of ads to peer pressure.	Project WILD- "Does Wildlife Sell Cigarettes"	A-13 B-5,15,20

*See Table 1 for list of needs/characteristics

Examples of Lessons

Relevant and motivational curriculum is often based on activities which build on the concept of self as unique and at the same time as an integral part of everything. John Muir's quote seems quite appropriate, "When we try to pick out anything by itself, we find it hitched to everything else in the universe." Table 3 provides a sample of lessons whereby the needs of at-risk students are directly linked to the modification of an environmental lesson.

The teacher-perceived value of environmental teaching-learning activities in meeting the needs of students is critical. The lesson plans of teachers, especially their personal comments in the journal section, help to provide an insight into the effectiveness of the lessons. A few lessons, selected as representative examples, follow.

Example 1 relates tree rings and people's lives.

Grade level: 4, 5, 6

Subject area(s) targeted for infusion: Social Studies, Science, Math, Language Arts

Environmental concept: Living things, like nature, go through a succession of changes and evolve through interaction with the environment.

Summary of instruction: In cooperative learning groups, students investigate and discuss various types of time lines in all areas of curriculum [social studies (events from 1400-1988); science (the age of the earth); math (computation)].

I introduced a cross section of a tree. Using large map pins, the annual rings were marked and connected by a string to a board indicating important events in a particular year of the tree's growth. The class then discussed and identified the differences in sizes and spaces between the tree rings. The science of dendrology was introduced. Students were given various math problems to compute regarding the tree's rings and the topics covered.

The students were then introduced to 2-3 inch diameter tree limbs (cross sections). Students in their cooperative learning groups investigated their "tree cookies" with magnifying glasses and discussed these questions: How old was the tree? Was the tree as old as you are? How many rings would you have if you were a tree? Is the cross section "more than" or "less than" the number of years you are? What influenced the tree's rings to be wider or closer together? Students then created a cross section of a tree based on a proposed timeline of their own lives. The environmental concept" was again discussed and students shared their thoughts. They then wrote a paragraph about how trees and people can be alike.

Source of infused environmental activity: Project Learning Tree "Tree Cookies"

Meeting characteristics/needs of potential dropouts: A1-4, 8, 9, 12, 16.

Teacher journal: My targeted students did very well with this activity. Their self-esteem and motivation seemed to be especially affected. I also noticed a movement toward "bonding." It seems to me that these children we are targeting lack a kind of bonding with nature and even their own families. They are detached. While participating in this lesson, these students began to grasp the ideas that

1. Their needs resemble those of all living things, and
2. The choices they made, and will make, affect the kind of person they are and can be.

These students responded to a multi-disciplinary approach. They seemed to understand and retain their knowledge much better than before.

Example 2 links math with use of the out-of-doors.

Grade level: 4, 5, 6

Subject area(s) targeted for infusion: Art, Math, Science

Environmental concept: The creative expression of one's relationship with nature is a significant and satisfying means of clarifying that relationship.

Summary of instruction: After reviewing basic shapes in geometry, we went on a nature walk and collected as many different shapes from nature as we could find. Once back in the classroom, we shared and discussed the shapes. For the rest of the week, students were to look at home and in their surrounding environment for various geometrical shapes. By this time we had made a bulletin board on geometric shapes, and the students were able to place their found objects in the proper category on the board. By the end of the week the board was covered with geometrical shapes of every size, color and origin.

Source of infused environmental activity: Project Learning Tree "Patterns in Nature"

Meeting characteristics/needs of potential dropouts: A 1, 2, 5, 12; B 2, 3, 5, 10, 11, 17, 21, 24

Teacher journal: This lesson enabled my target students to see geometry outside of the textbook. They were able to discover it, feel it, and experience it. This was something they could also excel in.

One targeted student in particular had a large collection of geometric shapes every morning. He was happy and excited to find and bring in these shapes and also enjoyed placing them on the board.

Example 3 channels an at-risk student into success by utilizing his art skills. At-risk students frequently excel in art.

Grade level: 4, 5, 6

Subject area(s) targeted for infusion: Language Arts & Humanities, Social Studies & Fine Arts.

Environmental concept: The responsibility of forest conservation should be shared by everyone. People can communicate and cooperate to preserve the beauty of our environment and improve the quality of life.

Summary of instruction: As a class we talked about the effects human actions had on the outdoors. We listed ideas on the board I asked the students to recommend proper behaviors such as: use of the trash can, don't play with matches, don't litter. I explained to the class that we were going to make an environmental coloring book for younger students.

I then explained that I would like some individuals to draw a picture of each statement. I assigned the task of printing the statements on the pictures to others. I also assigned the task of compiling the papers into books to another group of students.

When finished, students took the books into first and second grade classrooms and read them to younger students.

Source of infused environmental activity: Project Learning Tree "Outdoor Manners Coloring Book"

Meeting characteristics/needs of potential dropouts: A 1-5, 8, 9, 11; B 2-5, 10, 16, 17, 21, 22

Teacher journal: I decided on this project with one particular student in mind. Reading skills poor, motivation low, poor life choices, and responsibility seemingly non-existent characterize this student. But, this student was very artistic, always drawing pictures. The class nominated my targeted student as one of the artists because of his ever popular artistic ability. This was something the student could work on in spare time. It provided the student with a purpose and it reinforced good values and responsibility. When the book was finished, the student received a lot of praise and was proud to see the work in print. The student read the book to a kindergarten class, and this also provided success in reading.

Example 4 illustrates a long-term, cooperative learning project.

Grade level: 4, 5, 6

Subject area(s) targeted for infusion: Social Studies, Art, Science, Language Arts, Math

Environmental concept: People use planning and zoning methods to define and adjust land use because some land or human uses exclude others while some can coexist.

Summary of instruction: Students were to plan a city using their geometry skills. They were to consider things that are important in land-use planning: space, room for nature, energy, sanitation. Students had to describe actions that could be taken by cities to enhance them as places in which both people and wildlife could live. Cooperative learning groups of students developed model communities in which people live and work with the least possible negative impact on existing vegetation, air quality, water, soil and wildlife. They also had to trace the route of energy from source to use.

Source of infused environmental activity: Project Wild Planning for People and Wildlife," "Ethi-thinking," "Flip the Switch for Wildlife"

Meeting characteristics/needs of potential dropouts: A 1, 2, 9; B 2-4, 11, 15, 16, 21; C 2-4, 6

Teacher journal: The city planning projects turned out beautifully. All students took great care in considering all important aspects. They especially put much thought into the importance of space. During the lesson we looked at pictures of cities, some crowded, some ideal. We talked about crime and dropout rates in cities. We looked up statistics and then found pictures of cities that had a lot of crime. All were over crowded. My targeted students planned space for a university, wildlife refuges and places for people to walk and hike.

Example 5 is an interdisciplinary lesson which encompassed all middle school core curriculum.

Environmental concept: Wildlife has value as an inspiration for art.

Summary of instruction:

Science: How kites work based on wind currents, balance and flight dynamics. Relate kite flying as a clean, pollution free activity.

Reading-Language arts: Each group of students researches animal of choice and designs a kite. Each student writes a kite poem (done after kite flying).

Social science: Construct kites.

Math: Graph a kite using positive and negative integers.

Source of activity: Project WILD "Let's Go Fly a Kite"

Meeting characteristics/needs of potential dropouts: A 1, 2, 4, 8, 9, 11; B 1, 5, 6

Teachers Journal: Waited for a windy day to fly kites. Students were surprised that kites actually flew. There was much enthusiasm and participation as students were responsible for the results.

Example 6 is for the middle school curriculum with cooperation between the science and language arts - reading teachers.

Environmental concept: Humans and wildlife share environments and experience some of the same natural phenomena.

Summary of instruction:

Language arts - reading: After participating in the guided imagery activity "Stormy Weather," students discussed their visualized interaction of themselves and nature and wrote about it.

Science- Students discussed the appropriate scientific aspects of environment relative to stormy weather.

Language arts - Students were finally assigned one of the following activities:

1. write poetry - (Haiku, etc.)
2. essay based on their feelings.
3. short story based on their imagined experience
4. picture drawn to depict a visual scene they imagined
5. group presentation of pantomime or modern dance set to music showing their interpretation of experiences.

Source of infused environmental activity: Project WILD "Stormy Weather"

Meeting characteristics/needs of potential dropouts: A 2, 3, 4, 5, 9

Teacher journal: Successful experiences for all students.

Example 7 demonstrates that high school science can also build social interaction skills.

Grade level: 9, 10 (Alternative program within high school)

Subject areas targeted for infusion: Science

Environmental concept: Define symbiosis, commensalism, mutualism and parasitism. Recognize the infinite web of nature.

Summary of instruction: I introduced the lesson by writing the terms symbiosis, commensalism, mutualism and parasitism on the chalk board. The students defined the terms by deductive reasoning and I supplied needed information and clues to assist them. Also, we discussed who the students depend on and also who depends on them.

Each student was given one card from a deck of "Good Buddies" cards. After finding their buddy, the pairs of buddies researched to find out why they are buddies. They also answered the questions: Why do we live together? What advantages do we provide one another? What would happen if one of us wasn't here? The pairs then gave short reports to the class, each report being the product of their mutual effort.

Source of infused environmental activity: Project WILD "Good Buddies"

Meeting characteristics/needs of potential dropouts: A 4, 5, 8, 9, 11, 12, 16; B 4, 8, 11, 14, 15, 17, 22

Teacher journal: At the completion of the activity, students had gained an awareness of the various types of symbiotic relationships and had developed an awareness of the interdependence of the elements of our world. The at-risk students need to feel that they are an important part of their environment and this lesson caused them to develop a more understanding attitude toward the interdependence of society.

Example 8 involves high school students in an action project.

Grade level: 10, 11, 12 (Alternative high school)

Subject area(s) targeted for infusion: Social Studies

Environmental concept: Human and animal lives are closely interrelated. Both are subjected to and affected by similar environmental forces. Humans, however, can project intelligent as well as instinctual responses to environmental disturbances and therefore bear greater responsibility for understanding the role of caretakers of the environment.

Summary of instruction:

1. After "brainstorming," the students identified the following environmental problems: oil spills, toxic waste, smog, litter, noise, pesticides, smoke, crowded freeways, nuclear power, depletion of reserves of oil, land, erosion, extinction of wildlife, defoliation of plants, destruction of the ozone layer.

2. Students composed questions to interview friends, family, or anyone interested on the following items: 1) What is the most important problem facing the environment? 2) What can be done to change the environment? 3) What is the government's responsibility for the environment? 4) What can you do as an individual? 5) What about the future--is it too late?

3. Students conducted interviews, reported findings. Most concern was with pollution. Most interviewed believed the government needed to take more responsibility for passing stricter smog, zoning, and driving legislation to clean up the air. Most believed the individual can do a great deal to bear responsibility for the environment. Ninety-nine percent of the interviewed said, "No, it is not too late to save the environment."

Source of infused environmental activity: Project WILD "We're in this together"

Meeting characteristics/needs of potential dropouts: A 1, 2, 5, 11, 13; B 5, 11, 15; C 2

Teacher journal: Students easily related to this kind of activity. In general, they found people responsive to their requests, willing to discuss these problems and capable of making concrete suggestions to deal with environmental problems. Students became aware of individual responsibility in care of the environment and learned that others like themselves assume responsibility for the environment.

Example 9 demonstrates the motivational aspect of environmental activities.

Grade level: 10, 11, 12 (Alternative High School)

Subject area targeted for infusion: Social Studies

Environmental concept: Develop wildlife notebook

Summary of instruction: Students make sketches of wildlife using photos as subjects. Nine sketches and biographies are required. Work bound in a notebook.

Source of infused environmental activity: Project WILD "Drawing on Nature"

Meeting characteristics/needs of potential dropouts: A 1, 2, 13; B 3, 10, 11, 16

Teacher journal: This activity was optional; nonetheless, 5 of 15 students opted to participate. Several students offered outstanding drawings. Many at-risk students are interested in art. This exercise combines their interest in art with a concern for the environment.

Results of Classroom Implementation

Elementary Schools. In a follow-up questionnaire, the eleven teachers rated the environmental lessons they chose to teach as either good or excellent in meeting the needs of potential dropouts as well as all the students in their classes. These fourth, fifth, and sixth grade teachers were able to easily utilize lessons in an interdisciplinary manner. Most teachers did many more than the 10 required environmental lessons. Some selected environmental themes for extended units: national parks, issues in newspapers, and extinction of species. All felt that the two-day workshop plus follow-up meetings, was sufficient.

The teachers felt that targeting potential dropout students and designing lessons around their needs contributed to the success of the lessons for all students, not just a select group of students. Other comments included:

- Interest in the environment helped some students overcome some frustrations related to learning
- Value of activity-based program and little textbook work
- Cooperative interaction
- Students exhibiting responsible behavior
- Success in learning and building self-esteem
- Increased participation by targeted students
- Positive attitude toward environment and one another

Middle Schools (Core Curriculum). The seventh and eighth grade teachers who used environmental themes across the curriculum were ecstatic about the results

and future possibilities. These teachers (one each for mathematics, social science, and science and two for reading-language arts) were only hampered by their lack of familiarity with the materials and the extensive time required for planning.

Teacher comments about the valuable student results were similar to those by elementary teachers. Teachers also noted that student attendance increased during long-term projects.

These teachers have decided to share their results at a fall conference for middle school education. Their enthusiasm has already been shared throughout the San Bernardino City School District. Teachers at all nine middle schools have expressed interest in being trained to use environmental themes across the curriculum.

The middle school is presently the focus of educational reform in California to better meet the needs of sixth, seventh, and eighth grade students, including those at-risk. These reforms range from structure and content of the program to the implementation of a new teacher credentialing program specific for middle school teaching. Middle schools with core curriculum are now perceived to be desirable. The use of themes across the curriculum areas adds meaning and purpose. With new teacher training requirements, middle school teachers will be expected to utilize themes. The teachers in this project support that environmental education would provide effective cross-curricular themes.

Middle Schools (Self-Contained Classes and Basic Skills Pull-Out). The four participating teachers identified all of their students as at-risk. The teachers tended to develop lessons similar to those for self-contained elementary classrooms. They judged the lessons to be good to excellent in meeting the needs of students. Two teachers involved their students in action projects: (1) adopting trees and working to save from developers and (2) trying to get extra school cafeteria food to be distributed to needy people.

Use of school grounds as learning areas was judged as worthwhile and motivational to the students. Teachers at one school are now involved in planning a school nature area which will include a garden, pond, and native plants.

Alternative High Schools. The two social science teachers infused several environmental activities into their academic curriculum. A few activities were a

departure from the instructional program, but were well received by the students.

The four teachers at an alternative program within a regular high school used environmental education twice a week, with the goal of increasing student self-esteem. The teachers indicated that many of the activities met the needs of the students. The teachers also felt that the environmental activities would have been more effective if started in the fall rather than the spring. All of the teachers indicated that more planning time was needed to modify environmental lessons to meet the needs of at-risk students.

Conclusions on In-service Programs. The recommendtions from the involved teachers support the value of in-service programs linking environmental education to meet the needs of at-risk students (Table 4).

Suggestions on ways to increase the effectiveness of the in-service programs include providing more environmental lessons that address needs of at-risk students. Middle school and high school teachers suggest a longer program to allow time for planning. The need for more examples on effective implementation can partially be met through the participant-developed lessons in this project.

Table 4. Recommendations and Suggestions from Teachers on Environmental Education In-service Programs

All Teachers
- Continue to provide in-services that relate environmental education to dropout prevention. The concept has merit.
- Continue the effective workshop format and using the environmental guides.
- Continue to develop modifications and extensions of environmental lessons to address needs of at-risk student.

Elementary Schools
- Two days is sufficient for initial training.
- Have periodic flyers or meetings with ideas on new lessons to try.
- Develop correlations to language arts and social science to supplement science correlations.
- Do more demonstrations of cooperative learning.

Middle School - Core Curriculum School and Self-Contained Classes of Potential Dropout Student

- Do in-service as a 3-5 day workshop during summer, if possible. Time needed to assimilate and to plan.
- Provide examples of successful use of environmental themes.
- Provide monthly sharing and reinforcement of ideas.

Alternative High Schools
- Provide in-services in the fall.
- Allow more time for planning to select and infuse environmental concepts.

Excerpts from the written evaluation of the teachers are effective in their messages. The first two reinforce the value of the environmental education guides used in the in-service program.

Excellent materials--the most and best I have received as a teacher. Other teachers would also benefit from these materials.

> **These materials are ideal for the middle school concept of using themes or topics to teach across the curriculum.**

Even more gratifying are these teacher comments related to a change in their perception.

> **Certainly my attitude and that of my colleagues have shown sensitivity to an area we would never have deemed important.**

> **I can now better focus on what is important and on specific needs of my students. I can now spot a symptom of an at-risk student and find an activity to address it. I have had much success with this. As environmental education gives meaning to students, this program gave meaning to environmental education for me.**

Environmental education fits the needs of all students, including those at-risk of dropping out of school. By connecting the academic, emotional, and social needs of at-risk students with the benefits of environmental education, we contribute to the solution of two national problems: environmental literacy and student dropout.

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A CONSORTIUM APPROACH TO STAFF DEVELOPMENT

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Introduction

The strategy of a consortium as a management model for staff development and teacher training has spread in Alaska. This approach has fundamentally changed instruction in at least two disciplines in the state. The model facilitates change more effectively than any other approach I've been involved in for in-service education. This paper describes the management model and its application to environmental education. In the spirit of the theme of this year's conference of the North American Association for Environmental Education, "Working Together to Educate about the Environment," the Alaska Department of Education and its collaborators have used staff development models proven effective by other disciplines to enhance environmental education efforts in Alaska.

The consortium approach was first used in language arts, for writing. We borrowed from success in this area to establish a math training project, and have now used the lessons learned from both math and writing to develop a science/environmental education consortium. In the same way as we have borrowed from other disciplines, I hope you can transfer our Alaskan model to your own state and setting. The projects in Alaska are led by the State Department of Education and the University of Alaska. The model could be employed by any organization with a commitment to statewide change in education.

The rationale for using a consortium model is that, in order to change instruction on a broad scale, school districts and teachers need to "buy in." The overriding belief is that what happens after a training session or after a university institute is what makes a difference. The pedagogical philosophy common to all consortia in Alaska is a faith in the effectiveness of teachers teaching teachers. The necessity of the use of the consortium model originated from the reality of limited resources, both human and fiscal. To this end, a consortium by definition is "a combination of institutions for a common end, requiring resources of capital."

Though each consortium in Alaska varies in exact management plan, responsibilities, roles, and activities, there are fourteen agreed-upon features which characterize this staff development structure, and contribute to its success:

1. It is teacher-based; the teacher is the center;
2. Teachers are leaders in the management, services, and instruction within the consortium;
3. There is a statewide focus; all Alaskan districts may be eligible, to enhance their K-12 programs;
4. It is a process-oriented staff development model;
5. There is a common focus and sense of direction;
6. Sustained training is the core of consortia efforts, both in the form of an institute and with in-district follow-up training;
7. There is a research base for the practices/process;
8. There is quality control;
9. The State Department of Education provides coordination;
10. The university is actively involved in planning and implementation;
11. There is school district representation and input;
12. There is a letter of commitment from the District Superintendent;
13. All member institutions provide financial support;
14. Membership in a consortium is non-mandatory, and initiated at the district level.

Activities

Each of the three consortia--writing, math, and science--sponsor slightly different activities and training modes. Each offers a three- to four-week intensive summer institute. In addition, the writing consortium offers basic institutes on special interest topics. The math consortium uses its advanced institute as a time for fellows (teachers who have completed an

invitational institute) from different years to meet each other, and thus offers only one advanced institute of from three to six days duration. The science consortium has not yet offered an advanced institute, but is planning a series of one-week graduate credit courses which will focus on a new content theme and a specific teaching skill. For example, the content theme might be wetlands ecology; the teaching skill might be refining questioning strategies to elicit critical thinking on the part of students.

Only teachers in member districts are eligible to participate in consortium institutes. The criteria and method of selection vary slightly between consortia. In the science and writing consortia, the districts nominate teachers and a selection committee of the consortium makes the final selection. The math consortium allows the districts to make the final selection, but provides the district with criteria and a recommended process for selection. Participants in the month-long summer institutes must be experienced teachers, and are considered future leaders of the consortia.

State-wide school year activities can be viewed as administrative, networking, and instruction functions. The boards meet in person and by audioconference to establish policy and conduct the business of the consortium. In the math and science consortia, the first-year fellows (those who attended the summer institute the previous summer) meet in the fall to share instructional strategies and to hold consortium committee meetings.

Statewide networking activities, which keep the fellows connected, are newsletters and telecommunications via computer. All three consortia have newsletters, typically bi-monthly, during the school year. The math consortium has its own session on the Department of Education's computer bulletin board. Each science fellow received a modem and training on the University of Alaska computer network while participating in the summer institute. The math consortium's instructional audio-conferences also serve as networking tools.

Instructional audioconferences--conference calls to teach a particular topic--serve as the primary statewide staff development activity during the school year. Because of the state's size, travel costs are prohibitive. As elsewhere, the ability of teachers to leave the classroom during the school year is restricted. Travel time to attend a statewide meeting is often more than two days. Thus, instructional audioconferences save both

expense and travel time. Typically, the calls last an hour and a half. The first hour is used for instruction, and the last half hour is given to sharing of resources and troubleshooting among participants. A packet of materials is distributed in advance of the conference call. During the first year, sessions were open to all fellows. With growing participation, participants must sign up for audioconferences in advance. A series of audioconferences was offered for college credit for the first time during 1988-89. The participants pay a minimal college credit fee, and the consortium covers the expense of the phone calls.

Other instructional activities include conference presentations and the State Department of Education's talent bank. Each consortium offers presentations describing its activities and the methods that they promote at appropriate statewide conferences. The department maintains a talent bank of in-service leaders for local districts. Districts can call the department with requests for particular training, and the department will match their requests with the expertise in the talent bank. The math consortium has coordinated teacher training through the talent bank for the past four years. The writing consortium plans to begin use of the talent bank during the 1988-89 school year. Each year's consortium budget determines if funds are available to support the travel associated with the talent bank. The science consortium is not department-coordinated, so it supervises in-service presenters itself rather than using the talent bank.

Instructors or presenters in all training sessions, from the month-long institutes to the hour-long audio-conference presentations, are classroom teachers, often working with university faculty. The teachers receive facilitator training as part of their participation in the consortia.

These state-wide activities are paralleled by activities in each of the member districts. A membership requirement for district participation in the consortium is a 3-5 year plan for in-district activities. District plans vary from one another, but common elements include in-service programs, peer coaching, newsletter articles, audioconferences, and regional training. The writing consortium has a strong regional network, with cross-district training and audioconferences. The science consortium is establishing regional representatives to coordinate science and environmental education training and follow-up in each of five regions in the state.

District Responsibilities

The consortia are supported and run by the districts. The responsibilities of member districts can be illustrated by listing the commitments required of districts participating in the math consortium:

* Writing a letter, signed by the district superintendent, committing the resources necessary fully to activate the consortium within the district;

* Designating one teacher and one administrator to serve as district representatives and key organizers of consortium efforts, within the district and statewide;

* Working with institute fellows, district representatives, and school administrators to build a three- to five-year plan for in-district improvement of mathematics instruction; and

* Providing release time for fellows to work on activities related to the plan.

Costs to member districts include:

* $1000 annual membership fee.

* Travel and per diem expenses for district representatives to attend a consortium board meeting;

* Stipends for a team of up to six teachers to attend a summer institute;

* Travel and per diem for each consortium fellow to attend a follow-up training meeting during the year after their summer institute; and

* Approximately $200 per site for equipment and materials to implement instructional activities in the classroom.

Decisions governing the activities of the consortia are made by member institutions at face-to-face board meetings and audioconferences. The Alaska Department of Education, and all Alaska school districts and universities, are eligible for membership in the Department-coordinated consortia. Each designates two representatives, one teacher and one administrator, to represent its interests and provide the primary conduit for information for its fellows. In the math consortium, all of these representatives serve on the board. In the

larger writing consortium, with more than 30 participating school districts, board members are elected from each of the five regions of the state. Writing consortium district representatives meet annually and provide the primary contact. In the science consortium, only teachers serve on the board and as district representatives.

The Alaska Department of Education's Role

The Alaska Department of Education initiated the consortia, and acts as the coordinating institution for those in math and writing. The Department also provides the single largest contribution of funds to these two consortia. The science consortium's home base is the School of Education at the University of Alaska at Fairbanks. In the Department-coordinated consortia, the Department runs the business of the consortium and follows the policy actions of the board. The Alaska science consortium follows the Department's model and honors its 14 characteristic features, but it is university-operated. The Department is a member, and has a representative on the science consortium board. The science consortium hosts the application of the consortium model to environmental education.

Alaska Science Consortium

Environmental education is not considered a valid field by some sectors of the Alaskan educational community, including many school districts. The state is rich in excellent and award-winning environmental education endeavors. Most of these are considered anywhere from trivial to "not basic" by the bulk of Alaskan educators. Therefore, infusing environmental education into a hands-on science consortium seemed to be the most effective approach to gaining statewide support for it.

The Alaska science consortium is a state-wide staff development project that promotes a guided discovery, learning cycle approach to science instruction. As its base of instruction, it uses local, relevant examples from the student's environment. The objectives of the consortium are:

1. To increase teacher knowledge, skill, and application of science teaching methods which develop critical thinking and problem-solving skills;

2. To increase teacher knowledge of ecological, physical, and earth science concepts, particularly as they relate to the Alaskan environment;

3. To retain involvement of practicing teachers in the planning and delivery of such training;

4. To strengthen collaborative relationships between teachers, districts, University of Alaska at Fairbanks, Alaska Department of Education, and appropriate agencies;

5. To establish a mechanism for ongoing, long-term teacher training efforts.

While the other consortia are K-12, the science consortium is K-8. The science consortium's instruction is applicable to all teachers and students in this range, but developed from the needs of rural Alaska.

During the science consortium institute, instruction in the content of ecology is balanced with pedagogy. Typically, a half day of field and lab instruction in ecology is matched with work in the classroom, on classroom lessons appropriate to the learning cycle model and the age group. University of Alaska scientists provide ecology training, and University education faculty and classroom teachers lead the classroom instruction. During the first institute, scientists each provided a week to a week and half of half-day instruction. One covered communities, including tundra/muskeg, the boreal forest, and the forest after a burn. The other scientist covered freshwater ecology and limnology. Student lessons ranged from counting tree rings and measuring heights of trees to formulating hypotheses and investigations on succession.

In-service sessions led by science consortium fellows expand on these themes, using the local environment and community as the focus. A standard program is a thematic study of snow, a common denominator in Alaskan communities in the winter. Snow study lessons are integrated with lessons on the Eskimo language of snow and art projects. These programs culminate with the building of Quinzehs shelters; thus are combined a thorough understanding of snow with the "culture" of survival. A result of these activities is a state-wide network of acid rain/acid snow studies.

The science consortium was initiated with funds from Title II, and is now in the first year of a three-year National Science Foundation grant. The activities of

all these consortia require the equivalent of .5 to .75 full-time equivalent professional to coordinate activities, in addition to the time and staff needed for course preparation and instruction.

Additional information about the Alaska science consortium is available from Sidney Stephens, Rural College, University of Alaska, Fairbanks, AK 99775-0600; (907)474-6500.

ENVIRONMENTAL EDUCATION: THE IN-SERVICE EXPERIENCE

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Teachers will teach only what they are comfortable with. Therefore, it is not surprising that most teachers do not utilize environmental education techniques and strategies with their classes, nor do they take the time to address environmental problems and issues. Knowledge of the realistic constraints of a classroom situation, along with information garnered from recent research papers and on-the-job observations of many teachers, all support this generalization.

There is a certain beauty to conducting in-service workshops. Unlike college students in education courses, in-service workshop participants are already "in the system;" they can apply what they learn directly to their classes. Many have the added incentive of earning continuing education unit (CEU) credits for their participation. Some educators participate during professional release time. Thus, teacher participating in in-service workshops are the perfect audience, and that presents the challenge. A workshop leader must provide the participants with something they want and need, presented in a manner which stimulates them to take it back to their classrooms.

Unfortunately, and despite claims to the contrary, many environmental education workshops are not successful. A point to note--the meter of success is not what is written on the evaluation form, but rather how many teachers take the session back to their classrooms and utilize it with their students.

Workshop failure appears to stem from two problems that are often chronic among presenters:

1. Many workshop leaders are just not aware of the functioning of the classroom environment and related constraints.

2. Many workshop leaders, perhaps most, reinforce poor teaching strategies.

This paper addresses only the first concern; the second needs to be addressed in full on another occasion.

Following is a list of ten suggestions for workshop leaders. These ideas have greatly increased the effectiveness of workshops with which I have been associated.

Know Your Audience

Why are people attending the workshop? Are they being awarded CEU credits? Were they told by a department head to attend? What is their past experience with environmental education?

Perhaps more important--what grade levels are represented in the group? Kindergarten and grade one teachers will be looking for something very different than the person who teaches grade five or six, and high school teachers will ignore the whole session if it does not address their special needs.

When possible, it is most effective to present workshops that target specific grades (i.e., grades K-3, grades 4-6, grades 7-12). This type of situation correlates well with educational research on child development, and allows the workshop leader better to meet the needs of the participants.

Realities of the Classroom

In a 1987 Gallup Poll, the public was asked to list its top ten concerns with respect to education. Sixty-nine percent of the respondents suggested that their number one concern was a desire that schools go "back to the basics." Fifty-six percent suggested vocational education as their number one concern. This was followed by drugs and violence in the schools. Environmental education did not appear on the list. The critical thinking and problem solving skills associated with environmental education just made it, rating a nine spot.

Many teachers start the workday by attending placement and planning conferences. The teacher may then enter the classroom and find students sitting there with black eyes,or victims of child abuse, or accidents. Even in affluent districts, families may be in crisis. The at-risk population can be very high and several students may be from single parent homes. The teacher must meet the needs of all of these students. In addition, the class must prepare for the Mastery Test, maybe the reading scores have been low, or perhaps the district is

working through a new math program. These are just a few of the concerns that the classroom teacher has. All the while, public opinion polls are hanging over his/her head to validate the type of job that he/she is doing.

Workshop leaders cannot address or deal with most of the above realities. But they must at least be cognizant of them if they are going to make effective presentations to classroom educators.

Appropriateness to Grade Levels

Workshop leaders often select and conduct their favorite activities and lessons with the teachers, but these do not always relate to the grade levels with which workshop participants are working.

A student intern working at our center devised an experiment. She presented lessons on owl pellet dissections. On the high school level the students were excited; they discussed a number of ecological relationships associated with the evidence gleaned from the pellets. She next offered the lesson to a sixth grade class. Again, the students loved the activity. They liked the bones and skulls and they drew simple food chains and webs to illustrate their findings. Finally, the lesson was presented to a first grade class. On the walls of the classroom were magazine pictures of a paleontologist unearthing bones. The class had just finished studying dinosaurs and, when they opened the pellets, they were by all accounts the most excited class because they felt they had just found dinosaur bones.

The point is simple--lessons dealing with abstract concepts are not appropriate for younger grade levels. Don't waste good workshop time doing activities that the teachers can't use.

Relationships to Existing Curricula

Environmental education can be infused into all subject areas. Consider for a moment some of the (basic) skills that are developed when students are exposed to a good environmental education program--observation, data collecting, note-taking, organizing, graphing, reporting, making comparisons, critical thinking, problem solving, and communication skills; the list goes on. Despite these valid educational objectives, many workshop leaders present an array of activities and lessons, then tell the

teachers that the activities can be worked into the curriculum anywhere.

The workshop leader would be better advised first to become familiar with the curriculum the teachers are using--to become familiar with the scope and sequence of the science and social studies texts, to identify the performance objectives for the math and language programs. Then, when environmental education activities are presented in the workshop, the leader can illustrate where they fit into the existing scope and sequence of their programs, or how they teach to specific performance objectives.

Educators taught in this manner are more likely to infuse the activities into their curricula. They do not see it as finding room to teach something new; it is only a new (probably better) way to teach what they are already attempting to teach.

Use Available Materials

It is important that the bulk of materials utilized in a workshop are readily available or inexpensive. Nothing is more frustrating to teachers than attending a great workshop and realizing that they do not have the $300-$400 necessary to purchase the needed materials and equipment. Thus, workshop leaders must keep financial constraints in mind when conducting their sessions.

Immediate Classroom Application

No matter how good the workshop is or how appropriate the materials are, the classroom teacher wants something that can be taken immediately back to the classroom. Of course, the whole workshop doesn't have to emphasize immediate take-back, but it is important to throw in some quickies. Quickies are one, five, ten minute activities that are exciting, enjoyable, take no time to set up, and cost next to nothing. These types of activities are often taken right back (next school day) to the classroom and help to initiate the process(es) of environmental education while the teacher is gathering materials and resources to set up more complex, longer range lessons.

Positive Experience

Keep in mind the fact that most Americans spend 95% of their time indoors. You and I may be comfortable for a few hours in wet sneakers or wading through chest high grass, but for some teachers this could be a very new and threatening experience. Be receptive to their needs and fears.....be flexible. If the day turns out to be windy, raw, and damp, have back-up plans. No matter how good your session is, if the participants are cold and uncomfortable they will take that feeling back to their classroom, rather than a positive attitude toward environmental education activities.

Handouts

Teachers love handouts. They will take anything given to them. The problem is that workshop leaders inundate them with handouts--which, of course, get stuck in the bottom of a box in a corner. The teacher ends up with no time to dig them out, much less to read them. Try giving only the three or four most useful handouts. Then, if you feel it is necessary, send a few more to them seven to ten days after the workshop. This insures that both sets of materials will be read. It also provides a follow-up that re-stimulates the teacher after the halo effect of the workshop has worn off. It is worth the postage.

Homework/follow-up

If you are fortunate enough to have the teachers over a period of time (i.e. two workshop sessions spaced a few weeks apart), use it. That is to say, assign homework. Several types of environmental education-related homework assignments are possible. I usually require the teachers to utilize some of the workshop activities with their students. When we meet again, we discuss and evaluate their experiences. If teachers are not going to see students before the next workshop session, they can present activities and lessons to the other participants or they can work on correlating the new activities and lessons with their lesson plans for the next month. All of this helps to insure that the educators will feel more comfortable with the materials and will use them on their own.

Follow-up is also important. I like to send out at least one evaluation form three to five weeks after the workshop. This helps to determine which activities are

being used. It also serves to motivate some of the teachers into action. This type of follow-up indicates that the workshop was important and that I am there for support if needed.

End on Time, but....

No matter how enthusiastic participants are, they do have other things going on in their lives. Whether it is a two-hour session or a two-day workshop, end it on time but be sure to schedule an extra half hour or so of rap time (not clean-up time). Some participants will be full of questions, others will just want to talk and process the experience. A cushion of built-in "extra time" may be very important to the attitude that the teacher takes back to the classroom.

PROFESSIONAL DEVELOPMENT IN ENVIRONMENTAL EDUCATION: A SUMMARY

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The stated focus of the symposium--teacher education in environmental education--is increasingly seen as an important issue in environmental education in North America. Symposia on this topic have taken place at two of the last three conferences of the North American Association for Environmental Education--in 1987 in Quebec City, and in 1989 in Estes Park. In response to this advertised focus, in each symposium a number of speakers reflected on experiences in either pre-service or in-service teacher education. This paper summarizes and discusses papers presented in the 1989 symposium.

Brief Descriptive Accounts of Presentations

The first paper was presented by Paul Hart. In discussing adequate preparation of teachers of environmental education, Hart examined two problems in teacher education: those of pedagogy and of research.

One of the problems is that environmental education has attempted to justify itself in terms of conventional validity and reliability measures and to conform to traditional curriculum development, implementation, and evaluation practices. Another problem is that those in environmental education have assumed that conventional quantitative research practices adapted from the natural sciences can answer practical pedagogical questions. Given that environmental education is a distinctive educational endeavor with interdisciplinary goals, Hart argued that notions of "defective" and "effective" teachers should be replaced by an image of "reflective practitioners." To "see" teachers as reflective professionals rather than as either defective or effective technicians is to adopt a different world view and underlying epistemology for teacher education. We have never had much evidence that all our "best" research based on applied science approaches has resulted directly

in improved practice. Perhaps a new approach to educational research in teacher education is required for environmental education--one that is based of an image of the "reflection-in-action" epistemology.

Jim Lubbers focussed on using cooperative learning as a pedagogical strategy for environmental education and as environmental education content in teacher education courses. His purpose in emphasizing cooperative learning was the development of "conflict management skills" applicable for students. In Lubbers' view, cooperative learning represents the ultimate teaching method for developing in students the management skills associated with the resolution of societal/environmental issues. Lubbers' interest is in reinforcing behaviors identified as linked with developing "productive and effective members" of conflict management groups.

Michael Gross (University of Wisconsin-Stevens Point) presented a paper on behalf of its absent author, Randy Champeau. Gross was a co-investigator with Champeau on the research reported in the paper, which examined perspectives of pre-service education students on course work in environmental education. Students were surveyed after a course to determine their perspectives on effectiveness of the course in preparing students for the State's mandated environmental education program. After reviewing the State of Wisconsin environmental education goals and the objectives used in the development of the assessment instrument, the paper demonstrates the perceived match between course activities and outcomes on the one hand, and the state's mandated goals on the other. After presenting data relating to students' perceptions of the value of mandated environmental education, the conclusion reached by Champeau was that "mandates or requirements are effective in putting bodies in desirable places."

Ian Robottom's paper drew on the example of <u>distance education</u> in environmental education to examine a number of assumptions and issues in teacher education--assumptions and issues that apply equally in on-campus environmental education, but are thrown into sharper relief by the circumstances of teaching at a distance. Issues examined include "the grip of print" (the idea that good environmental education is simply a matter of "getting the materials right"), the "loneliness of the long-distance learner" (the disempowering aspects of non-interactive transmissional curricula), the "solicitous surrender" of environmental education (the voluntary compromises engaged in to secure a position in the

traditional curriculum), and the need for appropriate criteria for judging success in environmental education (the inadequacy of conventional disciplinary criteria for assessing interdisciplinary environmental education). The paper concluded by questioning the role of conventional organizational structures and practices in creating and maintaining counter-productive power relationships in teacher education in environmental education.

Peggy Cowan also presented an account of staff development and teacher training taking place in a distance education context. She provided a list of features characterizing staff development in Alaska, including a common focus and sense of direction, a research base, and quality control. Cowan proceeded to illustrate how consortia in other subject areas have operated in Alaska. In discussing the local school district's responsibility and the state department of education's role in these consortia, Cowan described the context within which environmental education must be approached, in her view. She acknowledged the low status ascribed to environmental education in Alaska, which led her to prescribe an infusion of environmental education into a "hands-on science consortium as the most effective approach to gaining statewide support for environmental education."

An attempt to connect student dropout prevention to teacher in-service in environmental education was described by Darleen Stoner. Her paper focussed on a preliminary study of the effectiveness of "Environmental Education as Dropout Prevention" as the basis for in-service programs targeted at fourth through twelfth grade teachers. Stoner presented no less than eight lesson plans from well-known environmental curriculum guides; she also noted personal comments of teachers in an attempt to provide an insight into the effectiveness of the lessons. She made the observation that "teachers who used environmental themes across the curriculum were ecstatic about the results and future possibilities," claiming that teachers were hampered only by their lack of time and lack of familiarity with the materials. On the basis of her experiences with teachers involved in a two-day in-service program, Stoner concluded that connection of academic, emotional, and social needs of at-risk students with the benefits of environmental education contributes to the solution of two pervasive problems--environmental literacy and student dropout.

Emmett Wright described a cooperative model for teacher in-service in environmental education, outlining

a strategy for a two-day workshop. Strategies were presented for conceiving, organizing, publicizing, presenting, and evaluating an annual in-service program. The paper also includes suggestions for workshop planning, publicity, budgeting, and providing college credit, and a sample agenda. Also presented is a list of hints for conducting workshop activities. Among the reference materials recommended for such workshops are such well-known centrally produced curriculum materials as Project WILD, Project Learning Tree, and the CLASS Project.

Juan Sanchez provided a list of ten suggestions for workshop leaders designed to increase effectiveness of workshops aimed at preparing classroom teachers to become environmental educators. Some of the justifying principles advanced by Sanchez in support of his ten suggestions are:

--the targeting of workshops to specific grades correlates well with educational research on child development;

--there are manifold realities in the classroom;

--abstract concepts are not appropriate for younger grade levels;

--environmental education can be infused into all subject areas;

--workshop materials should be inexpensive;

--teachers like activities that can be taken back immediately to the classroom;

--teachers love handouts;

--follow-up is important.

The Implicit Debate

The title of the symposium suggests a focus on "teacher education in environmental education;" this focus can be (and was) addressed at a number of different levels. Some accounts were descriptive of current practices (e.g., Wright and Cowan); some prescriptive of certain practices (e.g., Stoner, Champeau/Gross, Lubbers, and Sanchez); and others more issues-oriented, examining in a theoretical fashion some of the dilemmas in teacher education in environmental education (e.g., Hart and

Robottom). It must be noted that some of the papers only tangentially addressed the question of "how to educate teachers to become environmental educators." For example, the primary focus of Stoner's paper was the potential of environmental education as a mechanism for diminishing student dropout, while Lubbers' paper focussed on a particular pedagogical strategy for use with school pupils rather than on professional development activities for prospective teachers. These approaches are not unreasonable, because in addressing their own interests these writers imply particular preferences for content in teacher education courses. In describing and advocating certain teaching strategies for use in classrooms, they are challenging teacher educators to consider how best to prepare teachers to use these strategies.

In addressing the overt focus of the symposium--"how best to prepare teachers for environmental education"--each paper adopted either explicitly or implicitly a position on the issue of professional development for prospective or current teachers of environmental education. The following principles, grounded in the symposium, are proffered in the interests of opening the debate about what is to "count" as adequate forms of professional development.

Participatory, Practice-based. A number of papers from this symposium described pre-service or in-service teacher education programs that are participatory and practice-based. Wright and Stoner described in-service models that involved teachers in experiences using centrally produced environmental education curriculum packages. Their view is that involvement in practical in-service activities based on such materials is a necessary precursor to effective teaching of the materials.

There are limitations to this approach, if the activities fail to treat the curriculum materials themselves as problematic--as being able to be critiqued in the light of practical experience. There is a tendency in some workshops for the materials and the ideas and values embedded in them to be, in a sense, taken for granted; they represent an external "theory" which teachers are expected to translate into classroom activities in the "practical" experiences of the workshops. This form of "practical" activity is less concerned with informing improvement of the materials (and their prescribed practices) through constructive critique based on practical experience than it is with the simple, instrumental task of attempting to

"encourage" teachers to align their practices with the practices prescribed in the materials. In the former, the materials are perceived as unproblematic exemplars of preferred practice; in the latter, they are seen as grist for the mill of critique based on experience. It could be argued that for a program to be truly practice-based, teachers and their students should be involved in the practice of developing their own curriculum materials through a process of critical appraisal of existing materials.

Research, Enquiry-based. At least two of the symposium papers adopted or reported a research- or enquiry-based program. Cowan's consortium approach to professional development for teachers of environmental education involved participants in exercising certain scientific enquiry skills, like hypothesizing and measurement in the field. Application of science teaching skills through guided discovery approaches also figured in the program, with opportunities for appraisal of appropriate classroom activities in the light of the immediate scientific experiences in field and laboratory.

A difference between the programs reported by Cowan and by Gross/Champeau is that whereas the Alaskan approach is responsive to initiatives and commitments emerging from practitioners themselves (it is a voluntary program), the Wisconsin program follows an external imperative (it is mandated that teachers participate). In the latter program, the substantive educational assumptions informing the program are secured by the state mandate. It would be interesting to examine from a longitudinal perspective the lasting outcomes of the two kinds of programs--one based on intrinsic motivation, the other assuming the effectiveness of external imperatives in professional development. One aspect of such a longitudinal enquiry might be to appraise the underlying educational (pedagogical and curricular) assumptions and justifications of the respective programs themselves--treating educational issues (not just scientific issues) as problematic. In this way, current educational practices in environmental education could be regarded as having the potential for improvement through participant research.

Critiquing Current Practice. Hart argues that environmental education professional development should be critical, in the sense of encouraging critique of current environmental education practices. His paper contributes a framework for critical appraisal of professional development programs in environmental

education. His distinction between approaches based on assumptions about "defective," "effective," and "reflective" teachers focusses attention on different views of the professional status of teachers embodied in teacher education programs. In arguing for programs supporting professional development as critical self-reflection, Hart argues that reflective teaching is more closely aligned with environmental than scientific world views--that is, that it is more coherent in environmental education for our enquiries to be informed by a holistic environmental paradigm than by a reductionist, scientific one.

Sanchez' paper adopts a different approach, in that his presentation of "tried and true" strategies for running environmental education workshops tends to be concerned with presenting techniques whose "effectiveness" is assumed (as established through the personal experiences of the presenter), rather than creating the conditions for critical "reflection" by workshop participants on the educational and other values embedded in the techniques themselves.

Community-based. In discussing the problem of professional development in environmental education at a distance, the paper by Robottom identifies the need for programs that are community-based, in recognition of the fact that environmental education (especially at a distance) is doubly idiosyncratic. In one sense, environmental issues that form the substance of environmental education work are specific in terms of time and space. In another sense, educational problems are rarely susceptible to universal solutions. One of the lessons to be gained from distance education is that in environmental education professional development, there is a great opportunity for grounding the substantive tasks for participating teachers in environmental and educational issues existing in the teachers' own communities. An important research question concerns the tendency for non-community-based professional development programs to structurally pre-figure curriculum content for environmental education for teacher-participants in a way that diminishes the perceived environmental and educational relevance of the program.

Collaborative approaches. A number of papers addressed the collaborative nature of professional development in environmental education. In Cowan's paper, the Alaskan program was based on a notion of consortia aimed at strengthening and exploring interrelationships between, scientists, teachers, and

other appropriate agencies. Both Lubbers and Wright stress cooperative learning as a preferred pedagogical process for school pupils, but by implication also recommend this for teachers involved in professional development. Lubbers extends the notion of cooperative learning as a means of developing conflict resolution skills.

Another reason for supporting professional development that is collaborative is that environmental education improvement in schools is often a political endeavor, and collective action is usually more productive than individual effort in the context of political struggles. It must also be said that because the principles of professional development developed above represent a departure from the traditional professional development paradigm, it is likely that attempts to manifest these very principles will therefore create situations that will be political in character.

Conclusion

In general, and from diverse viewpoints, these symposium papers all address the question of how to conduct professional development in environmental education. Through the use of these many local examples, several general principles seem to have been supported. These general principles are that professional development in environmental education should be:

--participatory and practice-based;

--research- or enquiry-based;

--critical;

--community-based; and

--collaborative.

These papers also explicitly or implicitly point to several possible research questions relating to educational problems in this field of professional development. The authors of this summary recommend that: this research agenda be pursued; further analysis of these issues be pursued at subsequent symposia; and the Association's interest in these issues be continued.

For environmental education to survive and to be distinctive, there is a need to ensure that critical educational debate about environmental education

professional development continues, so that our practices are informed by educational paradigms and imperatives, rather than being coopted by the scientific paradigms and imperatives currently dominating our environmental education thinking.

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Jim's college-level experience includes teaching environmental science and science-technology-society types of courses, and working with both pre- and in-service teachers in virtually all aspects of science education. In recent years, his interests have centered on the Science/Technology/Society trend in education as a synthesis of science education and environmental education, and also on Cooperative Learning as a catalyst for reform in education. He has been an active member of the North American Association for Environmental Education for more than ten years, having made several conference presentations. For the 1988 NAEE conference in Orlando, he organized a symposium exploring the potential for working relationships between NAEE and the National Association for Science, Technology, and Society.

IAN ROBOTTOM is a senior lecturer in curriculum studies in the School of Education at Deakin University, Victoria, Australia. He taught science and biology in secondary schools in Melbourne before joining the State College of Victoria at Geelong as a lecturer in science methods and environmental studies. His Master of Education thesis at the University of Melbourne was on innovation in the science curriculum. He joined Deakin University in 1977 and completed his Ph. D. on environmental education as educational reform.

Ian was an evaluator of the Australian Curriculum Development Centre's national Environmental Education Project and is a member of the Council of the Australian Association for Environmental Education, editor of the Australian Journal of Environmental Education, and editor of Environmental Education: Practice and Possibility, published by Deakin University Press in 1987. His current research interests lie in the field of participatory (interpretive and critical) approaches to professional development and curriculum development.

For the past 17 years, **JUAN A. SANCHEZ JR.** has served as director of the environmental education program, grades 4-12, for the Manchester, Connecticut, public school system. He teaches an undergraduate course entitled "Environmental Education" as an adjunct faculty member at the University of Hartford, and also teaches graduate classes at Southern Connecticut State University during the summer months. As a consultant to the Connecticut Indian Education Council, he often conducts related workshops at teacher education programs.

Most of Juan's adult life has dealt with learning about and sharing the wonders of the natural environment with others, in order that humankind may develop a more harmonious relationship with the land. He has conducted numerous teacher workshops and adult programs, including a general nature walk ("The Magic Forest"), literary walks utilizing the works of Robert Frost, Aldo Leopold, Henry David Thoreau, John Muir, and others, and programs dealing with Native Americans' relationships to the environment. In addition, he is an active member of the North American Association for Environmental Education and a state facilitator for Project Learning Tree.

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At her campus, Darleen coordinates the masters degree program in environmental education and directs the Environmental Education Resource Center. She founded the network for Environmental Science Training (NEST) that links the university with school districts, agencies, organizations, museums, and businesses to

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EMMETT L. WRIGHT is a professor of environmental education at Kansas State University, Manhattan, Kansas, and serves as head of the Division of Teacher Education. Previously, he taught junior and senior high school mathematics and science in Kansas schools, taught biology and science education at Pittsburg State University, and served as professor of environmental education and coordinator of the Conservation and Resource Development Program and as Director of the Science Teaching Center at the University of Maryland.

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